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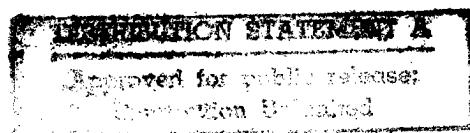
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# USSR Report

LIFE SCIENCES

BIOMEDICAL AND BEHAVIORAL SCIENCES



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5 October 1984

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LIFE SCIENCES  
BIOMEDICAL AND BEHAVIORAL SCIENCES

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AEROSPACE MEDICINE

UDC 591.1

FUNCTIONING OF VESTIBULAR APPARATUS AS GYROSCOPIC SYSTEM DURING BIPLANAL ROTATION

Moscow IZVESTIYA AKADEMII NAUK SSSR. SERIYA BIOLOGICHESKAYA in Russian No 2, Apr-May 84 (manuscript received 16 Aug 82) pp 259-265

VOROB'YEV, O. A.

[Abstract] With the development of transportation means, conditions are created wherein humans are subjected to several simultaneous rotations in intersecting planes. These forces cause typical vestibular reflexes, such as illusory feelings of one's own motion and the shifting of objects in the field of vision. The present article reports on study of features of combined stimulation of otoliths and inner ear canals under such circumstances to assess their interrelationships with sensory vestibular reflexes such as illusory feelings of motion. Conditions of motion and inertia are analyzed. The otoliths are presented as points with the irritants under study attached. Results of calculations show the independence of the gyroscopic moment and consequently of the reaction of the otolithic receptors. This must be considered in determining the magnitude of the rotating gyroscopic effect, since the anatomical effect is closely related to it. The gyroscopic forces are found to affect the receptors in both horizontal and vertical inner ear canals. Thus the vestibular apparatus functions as a gyroscopic system, at least in relation to the formation of vestibulosensory reactions. Figures 3; references 17: 10 Russian, 7 Western.

[690-12131]

UDC: 633.111:631.524.86

WHEAT RESISTANCE TO VIRUSES AND ITS EVOLUTION UNDER INTENSIVE BREEDING

Moscow SEL'SKOKHOZYAYSTVENNAYA BIOLOGIYA in Russian, No 1, Jan 84  
(manuscript received 14 Feb 83) pp 86-92

[Article by A. M. Burdun, I. V. Panarin and Ye. S. Zabavina, Krasnodar Scientific Research Institute of Agriculture imeni P. P. Luk'yanenko]

[Text] The distribution of wheat viral diseases, their deleteriousness, wheat resistance to viruses and evolution of this character under natural and controlled environmental conditions are discussed on the basis of the results of the authors' studies and data in the literature. An assessment is made of achievements and directions of breeding wheat cultivars that are resistant to viruses. There is discussion of the possible consequences of breeding wheat for immunity to different species of viruses and their combinations.

The development of biological science and intensification of agriculture have produced beneficial conditions for breeding new, highly productive forms of plants: wheat grain output has increased from 220-240 to 380-390 million tons from 1970 to 1975 in the world, and this was largely due to the increased harvest per unit area [1, 2]. However, there are several adverse consequences of introduction of new, highly productive and highly specialized wheat cultivars with a limited gene pool on enormous areas. For example, there is a decrease in ecological adaptability of crops, they are more stricken by pests and viral epidemics develop [1-3].

Viral diseases are among the basic factors that limit wheat harvest [4-8]. In worldwide agricultural practice, more than 20 species of viruses that strike this crop have been reported. They are distributed in virtually all areas and are the cause of detriment to agriculture, to some degree or other, in various countries each year. For example, the streak mosaic virus of wheat damages appreciably the agriculture of virtually all of the states of the United States and Canada, European and Asian countries [8].

In nature, the viruses usually accumulate on the wild flora and, when conditions are favorable, they strike cultivars. Unlike fungi and bacteria, viruses cannot penetrate independently into plant tissues. Most phytopathogenic viruses are spread by vectors--insects, mites and nematodes--as well as through seeds, soil, pollen and juice. Vectors usually settle along the boundaries of fields at first, then gradually spread over the entire planted area (with equal probability on production plots, experimental fields and even hothouses).

Viral diseases are virtually a mandatory condition of existence of naturally occurring phytoecosystems and agroecocenoses. However, the evolutionary pressure of viruses as a pathogenic factor is probably not sufficiently expressed; moreover, selection of better adapted plant forms is made difficult by the presence of a complex of viral species with different virulence and deleteriousness.

Wheat resistance to viruses under uncontrolled conditions and its evolution. It is known that, in plants, the mechanisms of protection against a pathogen consist of preventing contact with it (including resistance to vectors) and increased activity of metabolic processes, which make it possible to meet the needs of both the host plant and pathogen with regard to photosynthetic products without particular detriment to harvest. In the former case, there is development of pseudoresistance, which is an independent system in the joint evolution of the host and parasite; in the latter case, it is host tolerance. With such interaction, the host is subject to stronger pressure of selection than the parasite. Through competitive relations in cenoses, the adaptive functions of the host ultimately lead to development of immunity. The host that has high tolerance or immunity to a parasite may utilize the presence of a pathogen in the cenosis in competing for space. A parasite-immune form, which has won a specific ecological niche, forces the parasite to counteradapt, as a result of which new, more aggressive strains or races appear [9, 10].

Analysis of spring and winter wheat resistance to viruses, which was made by methods developed at the Krasnodar Scientific Research Institute of Agriculture [4, 11], revealed that, under the influence of natural selection in the case of spontaneous infection and spread of viruses in naturally occurring phytoecocenoses and agroecocenoses, evolution of forms of the genus *Triticum* proceeded primarily along the route of development of the first type of resistance-- prevention of contact with the pathogen due to resistance to vectors of viral infection. Thus, as a result of assessing spring wheat resistance against a background of spontaneous infection during a period of viral epiphytics (1971 and 1976), out of 2860 specimens of collection and breeding material of the Krasnodar Scientific Research Institute of Agriculture none was immune, 15.8% were relatively resistant, 76.3% moderately susceptible and 7.9% were markedly stricken. Thus, 92.1% of the genotypes were stricken to no more than an average extent and provided for satisfactory reproduction of offspring. Viral diseases, which elicit male sterility in severely stricken specimens, were instrumental in intensified exchange of genetic information between specimens within different forms and between them, and consequently further evolution of host adaptation. Analysis of the genotypic composition of relatively resistant forms of wheat revealed that, in different years, different genotypes are characterized by different degrees of resistance to viruses, and the genotypic composition of relatively resistant forms varies in different years. This is attributable to the fact that plants are not infected simultaneously, and the same viral species are transported from their reservoirs to cultivars by different vectors [12, 13]. At the same time, the genotypes are dissimilarly protected against different insects that are virus carriers, and for this reason the degree of prevention of contact with a parasite (or virus) differs in different wheat forms when invaded by different pests. For this reason, with this type of resistance in naturally occurring wheat populations and in the experimental collection of bred forms

one observes a change in relatively resistant forms in the presence of different viral epiphytcs. This is also aided by the difference in composition of dominant species in the viral complex in the epiphytic period.

These processes are particularly distinctly demonstrable when assessing the genotypic diversity of the genus *Triticum* under conditions of artificial infectious backgrounds [4, 5].

As shown by our studies, which were conducted for 7 years on special fields with a rigid infectious background, with severe viral invasion, many specimens of spring wheat that were evaluated as resistant against a natural background were stricken [11]. Resistance persisted only in a few specimens of the species *T. monococcum* and *Triticale* forms. In 1976-1981, we annually evaluated 130 to 193 specimens of spring wheat referable predominantly to breeding material in field experiments against a rigid infectious background. Analysis of the results revealed that it was only in 1978 that the level of viral invasion was low against a natural infectious background. More than 10% invasion was found in 39 out of the 150 specimens analyzed. However, with such low involvement, the harvest against a viral background constituted a mean of 72.4% of the optimum (i.e., under aviral conditions). In the other years (1976, 1977, 1979-1981) there was marked involvement (Table 1).

Table 1.  
Spring wheat resistance to infection  
by a viral complex

YEAR OF TESTS	NUMBER OF SPECIMENS	PERCENTAGE OF STRICKEN PLANTS		MEAN GRAIN MASS PER PLANT % OF CONTROL
		MEAN	RANGE OF FLUCTUATION	
1976	157	72.0	34.5-100	63.2
1977	193	93.2	8.0-100	34.2
1978	150	11.5	0-100	72.4
1979	175	74.0	55.0-100	68.4
1980	146	73.5	50.0-100	25.3
1981	130	34.6	6.9-75.5	68.7
MEAN	951*	60.3	25.7-95.9	58.7

\*Sum. Wheat resistance to viruses was determined from number of stricken plants (%), degree of involvement was rated on a 5-point scale, where 0 referred to healthy plants, 1 mild symptoms, 2 distinct symptoms, 3 depression of plants, presence of rosettes and dwarfs, 4 leaf drying, plant death before formation of harvest

the 3-202-3 line was not tested under change in composition of the best breeding lines with regard to resistance.

We found that, against the artificially produced background of combined viral infection, which was analogous in composition of viral species to natural conditions, selection of resistant forms was virtually impossible. The forms isolated in this manner in 1976 for resistance were discarded in 1977 due to marked viral invasion.

Pirotriks 28 [1] cultivar, which is immune to bromegrass mosaic virus, was 97-100% stricken by other viruses in 1977, 1979 and 1980, and it is only in 1981 (Table 2) that it was among the best for this character (28.2%). Line 3-202-3 (Canada) is immune to streak mosaic virus of wheat according to the data of Atkinson and Larson [14, 15]. According to our data, it was also immune to the Krasnodar isolate of streak mosaic virus of wheat, but was severely stricken by bromegrass mosaic virus. When evaluated against a natural infectious background in 1977, the involvement with one of the viruses in the complex reached 89%. Subsequently these conditions. Thus, there is annual change in composition of the best breeding lines with regard to resistance.

Table 2. Characteristics of best lines of competition strain testing against background of spontaneous infection by a set of viruses

CULTIVAR, LINE	PERCENTAGE OF PLANTS STRICKEN						
	1976	1977	1978	1979	1980	1981	1982
SETE TSERROS 66 (st)	93,4	98,0	4,0	100	100	48,0	98,0
DRUZHINA	65,1	100	2,0	100	100	2,2	100
SALYUT	87,5	28,0	3,0	86,0	100	53,9	—
PIROTNIKS 28	—	100	4,0	97,0	100	28,2	100
AL'IBIDUM 56h181/488	94,8	100	3,0	96,0	100	37,3	100
3-202-3 (CANADA)	—	89,0	—	—	—	—	—
IZUMRUD	—	100	7,0	100	100	52,5	100
KRASNODARSKAYA 362	—	100	3,0	100	100	64,1	99,0
MELYANOPUS 7	—	100	1,0	100	100	89,4	98,0
SPEKTR	—	100	5,0	94,0	100	57,5	99,0

Note: Dashes in the table mean that relevant tests were not performed.

It was virtually impossible to isolate resistant forms in some years (1977, 1980). In spite of the fact that some specimens have already been forwarded for state strain testing, none of them was encountered twice in this period among the best for resistance to viral diseases. Thus, in the absence of monitoring of species composition in a complex of viral diseases in a specific ecological zone, domestication conditions do not give wheat advantages for development of adaptation to a parasite, since selection does not secure neogenesis in generations. Domestication, which is a powerful stimulus for appearance of new states in genes and their combinations, has not yet been helpful with respect to viral diseases in accelerated development of immunity in wheat. Wheat resistance to viruses under natural (uncontrolled) conditions develops in the direction of prevention of contact with viruses and increased resistance to their vectors. For this reason, winter wheat should be sown at the times of diminished activity and number of vectors and spring wheat, in February and the first 10 days of March, so that maximum vector activity would be referable to later stages of ontogenesis, when wheat loses its attraction to pests and they prefer to feed on representatives of wild flora.

Wheat resistance to viruses under controlled environmental conditions. Intensification of agriculture makes it necessary to constantly improve agricultural plants, and use of pseudoresistance of plants to viruses does not always satisfy production. In this regard, breeders are faced with the problem of developing effective methods of protecting crops and selecting resistant forms. Evaluation of resistance of wheat plants (Pirotniks 28 and Skala cultivars) to bromegrass mosaic virus in a hothouse for winter planting revealed two collection specimens that were immune out of a total of 5042. It was previously not known that these cultivars are immune to bromegrass mosaic virus. Selection, preservation and use of these forms for breeding would be impossible without checking for different viruses and identifying them in infected plants [16].

Evaluation of breeding material for immunity to bromegrass mosaic virus under hothouse conditions made it possible to isolate economically valuable forms immune to this disease within a short period of time. Cultivar resistance to different viruses can be well-reproduced under hothouse conditions, and this

permits reliable evaluation of the material (Table 3). After discovery of immunity of Pirotriks 28 and Skala cultivars to bromegrass mosaic virus in 1975, we studied the genetics of their immunity in 1979 and by 1982 several economically valuable forms were produced which combined immunity to this virus with resistance to a number of its vectors and vectors of streak mosaic virus of wheat. In 6 years (from 1976 to 1982), the incidence of immune forms in breeding material of the Krasnodar Scientific Research Institute of Agriculture rose from 0.013 ( $13 \cdot 10^{-3}$ ) to 0.1 ( $10^{-1}$ ), i.e., by almost 100 times. The results of this work are also used by other breeders, particularly in the Scientific Research Institute of Agriculture of the Southeast.

Table 3. Resistance of cultivars and lines of spring wheat to bromegrass mosaic virus after artificial infection in hothouse

LINE, CULTIVAR	PERCENTAGE OF PLANTS STRICKEN						
	1976	1977	1978	1979	1980	1981	1982
SETE TSERROS 66 (st)	100	95,0	100	100	100	100	100
SALYUT	100	100	100	100	100	100	100
PIROTRIKS 28	0	0	0	0	0	11,0	9,0
SKALA	0	0	—	74,0	—	—	33,0
LUTESCENCE 513h11	—	—	—	—	0	0	3,0
VELYUTINUM 548h8	—	—	—	—	0	0	0
LUTESCENCE 444h7	—	—	—	—	100	100	100
LUTESCENCE 191h19	—	0	50,0	—	—	—	—
ERYTHROSPERMUM 140h1	0	11,0	—	—	—	—	—
ERYTHROSPERMUM 140h5	0	11,0	—	—	—	—	—
ALIBIDUM 56h181/488	—	15,4	100	100	—	100	100
DRUZHINA	—	—	100	100	—	97,0	100
KRASNODARSKAYA 362	100	—	100	100	100	73,0	100
MELYANOPUS 7	—	—	—	100	100	94,0	100
IZUMRUD	—	71,0	100	100	100	100	100
BEZOSTAYA 1	100	100	100	—	—	—	—
SPEKTR	—	94,0	100	100	100	100	100
LUTESCENCE 530h8	—	—	—	—	0	0	—

Note: Dashes signify that relevant tests were not made.

Basic directions of development of wheat resistance to viral diseases under conditions of an intensive breeding process. Development of wheat resistance to viral diseases, from formation of mechanisms for preventing contact with the pathogen to immunity to different viral species and strains, is apparently a general biological pattern. This is indicated by the high (on the level of immunity) resistance of wheat to viruses that do not attack it but are widespread in the meadowgrass [Poa] family, and presence of wheat forms (Pirotriks 28 and Skala) that are immune to bromegrass mosaic virus. Immunity of tall wheat grass (*Agropyron elongatum* L.) to streak mosaic virus of wheat and the wheat forms developed on the basis of hybridization with it (line 3-202-3) with replaced chromosomes [14, 15] are also indicative of such a pattern.

Thus, development of forms immune to viruses, which best meet the requirements of production for cultivars of the intensive type, coincides in selection direction with the vector of evolution of organism resistance under natural conditions. The coincidence of vectors of microevolutionary processes under domestication conditions with evolution of adaptive functions of a cultivar on a global scale is, in our opinion, beneficial to acceleration of progress.

in development of economically valuable forms and leads us to expect substantial success in breeding forms of wheat that are immune to viruses in the near future.

We are convinced, on the basis of investigation of resistance to viral diseases in base and breeding material, as well as analysis of evolution of adaptability, that development of forms that combine immunity to the most harmful viral species with resistance to the complex of the basic types of vector-pests that are distributed in the region for which a cultivar is developed should be considered the most desirable means of developing wheat resistance under domestication conditions.

For example, in northern Caucasus, the best forms will be spring wheat cultivars that are immune to bromegrass mosaic virus and streak mosaic virus of wheat, as well as resistant to injury by carriers of viral infection: red-chested leaf beetle (*Oulema melanopus* L.), grain flea beetles (*Chaetocnema aridulla* Gyll; *Rhyllotreta vittula* Redt.) and *Ariophyidae* mites (*Aceria tritici* Shev.).

Immunity to viral diseases makes it possible to use resistant wheat cultivars for intensive cultivation, including late spring and summer sowing, in order to recover two or several harvests of spring and winter wheat in a single vegetation period in the presence of complex biocenotic relations.

The advantage of such forms is graphically evident in experimental comparison of nonimmune cultivars susceptible to vectors and those immune to bromegrass mosaic virus and resistant to vectors in Krasnodar (Table 4).

Table 4. Yield of spring wheat as a function of level of involvement with viral diseases against a natural infectious background

CULTIVAR, LINE	IMMUNITY TO BMV	PERCENTAGE OF PLANTS STRICKEN AND GRAIN HARVEST, Q/HA					
		1980		1981		1982	
		%	Q/HA	%	Q/HA	%	Q/HA
WITH TWOFOLD PHOSALONE TREATMENT							
SETE TSERROS 66 (st)	-	0	32,7	-	-	2,0	48,0
DRUZHINA	-	0	43,0	0	42,5	0	45,3
LUTESCENCE 444h7	-	-	-	0	44,5	0	49,3
HORDEIFORME 34347B77	-	10,0	46,0	0	42,2	10,0	32,8
LUTESCENCE 513h11	+	-	-	0	44,5	0	41,8
WITHOUT PHOSALONE TREATMENT							
SETE TSERROS 66 (st)	-	65,0	27,3	-	-	61,0	16,0
DRUZHINA	-	10,0	36,7	10,0	35,5	10,0	43,3
LUTESCENCE 444h7	-	-	-	100	4,5	100	3,1
HORDEIFORME 34347B77	-	74,0	35,0	65,0	33,5	68,5	13,3
LUTESCENCE 513h11	+	-	-	10,0	38,0	10,0	38,6
P, %	-	-	4,8	-	3,2	-	2,9
HCP, Q/HA	-	-	3,0	-	3,4	-	2,5

Key: BMV) bromegrass mosaic virus      +) immunity  
- no immunity

Dashes mean that relevant analysis was not made.

The data listed in Table 4 were obtained when cultivars were raised with use of the pesticide, phosalone, and without such treatment of experimental plots. The Sete Tserros 66 cultivar and lines, Lutescence 444h7 and Hordeiforme 34347B77, were 61-100% stricken by viruses against a natural background when raised without chemical protection against the vectors of viral diseases. At the same time, specimens of Druzhina and Lutescence 513h11, where the plants were protected from vectors due to leaf pubescence, were virtually unaffected by viral diseases, even when there was no chemical treatment.

In 1982, lines Lutescence 444h7 and Lutescence 513h11 were cultivated with a reduced number of seeds for sowing (1 million germinating seeds per hectare). This provided beneficial conditions for reproduction of grain fleas. In this plot, Lutescence 513h11, which is immune to bromegrass mosaic virus, yielded a harvest of 35 q/ha with up to 1% viral infection against the background of applying phosalone at the tillering-booting phase. Under the same conditions, Lutescence 444h7 was 100% stricken, and the crop was completely sterile; the harvest of this line was virtually nil. Such differences indicated that both lines of spring wheat were stricken with the fleas and the reason for disease resistance in Lutescence 513h11 was its immunity to bromegrass mosaic virus. Other carriers of viruses were ineffective due to use of phosalone. For the same reason, we failed to detect noticeable damage to plants by pests.

The combination of immunity to viral diseases and resistance to carriers of the main viruses makes it possible to reliably protect wheat fields against 2-3 or even a complex of viruses. We consider expressly this to be the basic direction of development of wheat resistance under intensive breeding. For faster evolution of adaptability of spring wheat to viruses with domestication, it is necessary to develop forms that combine immunity to bromegrass mosaic virus from Pirotriks 28 and to streak mosaic virus of wheat from tall wheat-grass (line 3-202-3), as well as to intensify the search for sources of immunity to other species of viruses. It must be borne in mind that intensification of immunity to a parasite is capable of causing faster development of its adaptive functions (appearance of new strains). This, in turn, requires stricter control of genotype composition of cultivars in primary seed growing. Thus, in our experiments (Table 3), Skala and Pirotriks 28 cultivars began to be 33-74 and 9-11% stricken by the bromegrass mosaic virus after artificial infection by the end of the period of investigation (1976-1982). This is apparently related to change in virulence of the bromegrass mosaic virus and appearance of susceptible genotypes in the cultivars. Consequently, when intensive breeding is involved it is necessary to strictly monitor the gene pools of the cultivar and pathogen.

### Conclusion

Under natural conditions, because of the wide distribution of a viral complex in areas where wheat is raised, evolution of a parasite-resistant host proceeds primarily along the route of development of mechanisms of preventing contact with the parasite (first type of resistance). The immune forms of wheat that appear during epiphytic periods are not secured by natural selection due to wide fluctuations of dominance of different viruses in different years in the complex infectious burden of a specific ecological zone. With domestication and artificial isolation of immune forms from other representatives of a given cultivar species, the natural direction of evolution from the first

type of resistance to immunity conforms well to the direction of selection of forms of the intensive type for highly developed agriculture. Under the control of man, this direction of evolution could undergo accelerated development and offer the advantage of immune forms of wheat over others. The main directions of developing resistant wheat forms at the first stage of breeding is to combine immunity to 1-2 viral species (for the carriers of which it is impossible to develop resistant forms of wheat in a specific period of domestication) with resistance to carriers of other species.

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## EFFECTS OF MINERAL LIMITATIONS ON SPRING WHEAT

Moscow AGROKHIMIYA in Russian No 5, May 84 (manuscript received 8 Feb 83)  
pp 33-39

ARBUZOVA, I. N., NILOVSKAYA, N. T. and SHCHERBAKOVA, T. F., All-Union  
Scientific Research Institute of Fertilizers and Soil Science

[Abstract] Experiments were conducted on spring wheat to determine the effect of limiting the amount of nutrients on its yield. The tests were performed in a laboratory under well-aerated aquatic culture conditions. Sete Tserrors 66 short-stock wheat was used in all experiments except experiment No 5 where Verld Sidz 1877 [World Seeds?] was used. The exclusion of individual elements or the complete elimination of nutrients caused different growth periods. The control plants were cultivated using a complete nutrient mixture which consisted of (mg/l): N 99, P 21, K 180, Ca 90, Mg 33, Cl 47, S 44, Fe 2, B 0.2, M 0.003, Cu 0.02, Zn 0.02, Mn 0.02. The saline concentration was ~8.2 mM. The volume of the vessel was 12 liters. The exclusion of certain elements during the early stages of development decreased the amount of N in the above-ground part of the plants by 1.8-fold; of K-- by two-fold; of P-- by 1.6-fold. The elimination of N, P and K later for the same period affected their content in the plants to a lesser degree. The elimination of individual elements or the complete elimination of nutrients at the end of the vegetation period did not decrease the yield of the plants. However, the absence of N during the ripening of the grain decreased protein and mass. The complete elimination of nutrients at even later period did not affect yield, protein content or mass. Periodic daily starving did not effect the growth and development of the test plants. Based on the experiments, it was shown that spring wheat accumulates a surplus of N, P and K but not one of the tested feeding conditions was effective in raising the yield of spring wheat. References 18: 16 Russian, 1 Bulgarian, 1 Western.  
[1076-8802]

EFFECT OF HEAVY METAL POLLUTANTS ON SOIL

Moscow AGROKHIMIYA in Russian No 5, May 84 (manuscript received 23 Mar 83)  
pp 63-66

AVAKYAN, N. O., AMIRDZHANYAN, N. A. and UNANYAN, S. A., NIIPA [expansion unknown] of the ArSSR Ministry of Agriculture

[Abstract] Research was conducted in 1978-1981 to determine the amount and distribution of heavy metal pollutants (Cu, Mo, and Pb) in the soil, water and plants around a mining and chemical combine and their effect on soil fertility and plant yield. A 1:10,000 scale agrochemical map of the territory of several sovkhozes was compiled and samples of natural and cultivated plants were collected for chemical analysis at various distances from the combine depending on the nature of the terrain. Water samples were taken at the industrial discharge site and at 0.5, 1, 3, 5 and 10 km from the combine. Similar type samples, which were taken from areas remote from the combine, served as the controls. The investigation showed that the heavy metal content in all types of soils was high and varied quite a great deal, e.g., the amount of the gross and slip forms of the metals were respectively: Cu 120.8-178.0 and 18.5-107.4, Mo 4.6-15.6 and 0.8-6.5, Pb 26.3-165 mg/kg of soil as compared with 58.4 and 2.6, 3.1 and 0.41 and 11.3 in uncontaminated soil. The accumulation of heavy metals on the arable land and the forests, alpine meadows and pastures adjacent to it occurred because of the discharge of pollutants into the atmosphere. In irrigated areas, the contamination was caused by the use of polluted waters. The amount of contamination decreased the deeper one went. The copper and molybdenum content increased 40-fold over the past 10 years. The acidity of the river disappeared as the distance from the combine increased and as the acidic wastes were diluted by the water. The tests showed that there was a negative effect on spring barley when there were 20 mg/kg of copper. A decrease in yield due to molybdenum occurred at higher levels. The heavy metal content of plants in contaminated sectors was much greater than those in uncontaminated areas.  
No references.

[1076-8802]

EFFECT OF SOIL PROPERTIES ON COBALT-60 AND CADMIUM-115 STUDIED

Moscow AGROKHIMIYA in Russian No 5, May 84 (manuscript received 27 Apr 83)  
pp 82-87

YUDINTSEVA, Ye. V., FILIPAS, N. A., RATNIKOV, A. N. and VOSTRIKOVA, O. A.

[Abstract] The effect of soil properties on the behavior of Cobalt-60 and Cadmium-115 in the soil-plant system has been investigated in laboratory

and vegetation tests. Five varieties of sod and podzol soils, grey forest soil and leached chernozem were used in the tests. Cobalt-60 and Cadmium-115 were introduced into all tests in the form of chloride salts. The absorption of Cobalt-60 and Cadmium-115 depended on the saturation and acidity of the soils. The movement of the cobalt and cadmium in the soil and the size of their shift from the soils to the plants were determined by their interaction with the soils. Cadmium-115 was not absorbed as completely by the soils as Cobalt-60 which was absorbed by all soils. The largest amount of Cobalt-60 and Cadmium-115 was observed in a sod and podzol soil and a relatively low amount in the leached chernozem and grey forest soil. The relative content of radioactive cobalt and cadmium in the grain was less than in the vegetation mass; however it did reach significant levels (from 22 to 40 percent). The main plant part, which accumulated these elements, is the stock (from 32 to 64 percent). The leaves accumulated from 9 to 34% and the husk--from 3 to 9 percent. The use of lime and peat restricted absorption of Cobalt and Cadmium by the plants. References 11: 10 Russian, 1 Western.

[1076-8802]

UDC 632.951

#### CHEMICAL PROPERTIES AND EFFECTIVENESS OF NEW INSECTICIDE

Moscow AGROKHTMIYA in Russian No 5, May 84 (manuscript received 6 Jun 83)  
pp 91-103

GAR, K. A., MANDEL'BAUM, Ya. A., GUSHCHINA, N. I., BAKANOVA, Z. M. and LOMAKINA, V. I., All-Union Scientific Research Institute of Chemicals Used for Plant Protection, Moscow

[Abstract] Etaphos, a new Soviet insecticide based on O-ethyl-S-propyl-2, 4-dichlorophenylthiophosphate, has been tested produced in a 50-percent emulsified concentrate and experimentally in a 30-percent damp powder which act on contact with the intestines of an insect. Tests have been conducted to evaluate its effectiveness against various agricultural crop pests. The tests proved that etaphos in the above forms was a very effective insecticide and acaricide whose effectiveness is long lasting. It was effective against leaf-eating and boring caterpillars, fruit flies, a variety of beetles, plant-lice, worms, and other pests; it was highly effective against ticks which were resistant to other organophosphorus preparations. Suspensions made of 30-percent etaphos powder demonstrated high effectiveness against pests. Their toxicity was close to that of the emulsion. Emulsions made of 50-percent etaphos which contained up to 0.2 percent of the concentrate without the addition of a fungicide, were almost not phytocidal for all of the crops tested, including apple, peach and cherry trees. Etaphos emulsions in 0.15 percent concentrations were not phytocidal for citrus fruits and almost not for sugar beets. A 0.2-percent etaphos emulsion did not kill potato plants, and a 0.3-percent one did not kill cotton plants. The etaphos

emulsion could not be combined with fungicides containing copper because these mixtures killed plants. References 10: 9 Russian, 1 Western. [1076-8802]

UDC 632.95:633.511:(575.1)

#### EFFECT OF PESTICIDES ON TASHKENT OBLAST COTTON-PLANT AGROBIOCENOSIS

Moscow AGROKHIMIYA in Russian No 5, May 84 (manuscript received 27 Aug 83)  
pp 104-108

ROSLAVTSEVA, S. A., SHARAFUTDINOV, SH. A., TURAKHANOV, U. A.,  
ZHURAVSKAYA, S. A., TSOY, E. V., YEMTSEV, V. G., FEDOROV, Ye. P.,  
MAYOROVA, L. G., and MAKSIMOVA, Ye. N., All-Union Scientific Research  
Institute of Nature, Timiryazev Agricultural Academy, Moscow; IZIP [soil  
science institute?] UzSSR Academy of Sciences

[Abstract] The effect of the application of pesticides on the soil's agrochemical composition, the action of their residues in the soil and their effect on the microorganisms and the entomocenosis of a cotton field in Tashkent Oblast have been studied. The test section was treated five times during the pre-sowing and growing season (10 April-13 September) with various pesticides and defoliants. After treatment, tests were made of the residues and the microorganisms. The tests showed that the Kotoran residue had decreased fivefold on the 10th day after the application, by 30 percent on the 19th day and subsequently stabilized and remained for a long time. Rogor and Butifos residues disappeared quickly. The Fosalon residue was insignificant when application took place aerially. Rogor, Fozalon and Butifos residues could not be found in the soil after harvesting (28 November 1982). Kotoran, BI-58, Fosalon and Butifos were toxic only for certain microorganism groups; however, their depression effect disappeared 10-20 days after treatment. The use of BI-58 did not result in a decrease in the number of sucking pests. Fozalon completely protected the cotton plants from cotton and winter pests. The tests showed that the regular use of a large amount of chemical pesticides affects the agrobio-cenosis of the cotton field and that additional research is required along these lines. References 15: 14 Russian, 1 Western.

[1076-8802]

SPECIES COMPOSITION OF RICE DISEASE PATHOGENS

Moscow BIOLOGICHESKIYE NAUKI in Russian, No 3, Mar 84  
(manuscript received 9 Feb 83) pp 83-85

MATVEYEVA, Ye. V., PEKHTEREVA, E. Sh., CHUMAYEVSKAYA, M. A. and PIVINA, A. P.

[Abstract] Most well-known rice disease pathogens belong to the Psuedomonadaceae-Xanthomonas and Pseudomonas genera; the most harmful is *X. campestris* pv. *oryzae* (Uyeda et Ishiyama) Dye and its variants. The authors studied the species composition by analyzing rice leaves, stalks and grain suspected of infestation. Hypersensitivity tests were used to measure pathogenic properties on geranium leaves and inoculated 2-3 week-old rice. Types of rice disease as well as morphological and cultural-biochemical properties were analyzed. Groups of pathogens included bacteria that formed yellow, mucous, slowly growing colonies, some of which formed acid from saccharose, glucose and galactose, while others were less active. These bacteria were close to the *X. campestris* pv. *oryzae*, but differed in some respects, which are summarized. A second group consisted of bacteria that grew well as grayish-white, round colonies, while the third bacteria group had sharply pronounced biochemical activity that contrasted to the others. They rapidly liquefied the gelatin and permented carbohydrates forming acids and gas, reduced nitrates and hydrolyzed starches. Further research to explain the role of these bacteria in pathogenesis of respective bacteriosis is recommended. References 14: 1 Russian, 13 Western.

[712-12131]

FORMATION OF BIOLOGICALLY ACTIVE SUBSTANCES BY GINSENG CELLS IN ASSOCIATION WITH CYANOBACTERIUM CHLOROGLOEA FRITSCHII

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 276, No 4, Jun 84  
(manuscript received 8 Dec 83) pp 1017-1018

LOBAKOVA, Ye. S., KORZHENEVSKAYA, T. G., GOSEV, M. V. and BUTENKO, R. G.,  
Moscow State University imeni M. V. Lomonosov

[Abstract] Formation of biologically active compounds by ginseng cells in association with cyanobacterium were studied. Monoculture cells were grown in darkness on a modified medium of Murasige and Skuga. Presence of biologically active material was assessed by the quantity of total glycoside fraction (TGF). The content of TGF after 14 days of incubation indicated that the synthesis in monoculture was about of the same order as in association with cyanobacterium. The ginseng cells retained their ability to synthesize biologically active substances in mixed culture with cyanobacterium. Extract of ginseng cells at a 1:10 concentration stimulated respiration intensity of the bacteria. This evidently created favorable conditions for its growth. Figures 1; references 5: 4 Russian, 1 Western.

[729-7813]

## BIOCHEMISTRY

### IMPROVED ORGANIZATION OF PRODUCTION OF BIOCHEMICAL REAGENTS

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian No 11, Nov 83  
(manuscript received 13 Jun 83) pp 32-34

[Article by V. P. Zamakh and O. V. Kuftina, Biokhimreaktiv (Biochemical Reagents) Scientific Production Association]

[Excerpts] Effective organization and economic machinery for contacts between NPO's [scientific production associations] and scientific organizations, VUZ's and scientists with much experience in the production of special types of biologicals (for example, with laboratories of the Latvian State University and Riga Polytechnical Institute, Institute of Organic Synthesis of the Latvian Academy of Sciences and Institute of Molecular Biology of the USSR Academy of Sciences, which specialize in problems of biocatalysts and amino acids) is an important factor in augmenting the output of biochemical agents.

By 1985, it is planned to organize highly specialized plants for production of biochemical agents derived from nonalimentary oceanic raw materials and waste from the fishing industry (Vladivostok), as well as from plant raw materials (Nakhichevan).

Proceeding from the foregoing, it is deemed wise, in the first place, to expand in the immediate future the material and technical base of the Biokhimreaktiv NPO in order to increase significantly the output of products in which it specializes and, in the second place, to concentrate and specialize output of biochemical products, to organize and include as part of the NPO affiliates in Vladivostok, Nakhichevan and Abovyan, to establish intersector laboratories and experimental NPO production at scientific research institutes and VUZ's dealing with problems of biochemical technology, which have coordinating ties with the NPO. In addition, the distinctions of the end products, technology, raw materials, equipment, dynamics of development and consumers make it necessary to raise the question of singling out the production of biochemical reagents as an independent subsector.

The proposed measures pertain to augmenting the production potential for output of biochemical reagents. In addition, there must be provisions for a set of organizational steps for efficient use of this potential, in order to accelerate satisfaction of the needs of scientific organizations and others with regard to the products put out by the NPO. Under modern conditions of NPO operation, it takes an average of 1.2 years (with a production process lasting a few hours to 1 week) to fill a single request for biochemical reagents.

Studies have shown that the vast majority of biochemical reagents have a long shelf life. For this reason, it is possible to produce, for example, 3-5 times more reagents than are needed to meet annual demands (on the condition of organizing a well-developed storage system--bank (or shop) for reagents. If an ordered reagent is available at the bank, the consumer can purchase it immediately. The costs for storage and loss because of slow turnover of circulating capital are fully compensated by the additional effect on the national economy of faster scientific and technological progress in the sectors that consume biochemical reagents. In addition, there can be a cost efficiency from increasing the one-time volume of production of small-scale reagents thanks to savings on costs for modifying equipment, increased stability of raw materials and technology, improved adjustment of production personnel to rapidly changing technological processes and a savings referable to conventional permanent expenses. Problems of organizing production of multiple products, which are rather complicated at the present time, will also be simplified, since an increase in one-time output volume and availability of a wide assortment of chemical reagents at a warehouse will make it possible to relatively reduce the number of items produced annually to meet a single need.

Establishment of a centralized bank of techniques for production of biochemical reagents may be of great significance to reduction of time required to fill orders. When working on scientific and technological projects and technological preparation of a plant for production of biologicals, it is important to refine the entire spectrum of methods for recovery of analogue reagents or integrated processing of biological raw materials. In our opinion, the traditional orientation of scientific technological developments to some particular end product is unwarranted under the conditions prevailing at a given plant, since it subsequently causes duplication of work. It would be desirable to develop and have in the bank of renewable methods the technological specifications for as many biochemical reagents as possible, even if their production is not planned in the current year. This is particularly important for reagents for which the need is minimal or unstable, as well as new reagents, the need for which could increase significantly in the next few years due to the intensive development of biotechnology and bioengineering. The time spent on development of technological regulations and preparation of production, which is among the most significant factors in the time it requires to fill an order, could be appreciably reduced in the suggested instance.

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10,657  
CSO: 1840/674

UDC 576.851.258.0.94.7; 581,198

EFFECT OF STERIOD GLYCOSIDE DELTONINE ON BACTERIAL MEMBRANES OF MICROCOCCUS LYSODEIKTICUS

Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 19, No 6, Nov-Dec 83 (manuscript received 10 Aug 82) pp 788-794

TURGENBAYEVA, D. A., YERMACHENKO, V. A., KHARAT'YAN, Ye. F., PASESHNICHENKO, V. A., ZHUKOVA, I. G., LUKOYANOVA, M. A. and OSTROVSKIY, D. N., Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences, Moscow

[Abstract] Continuing earlier work on the steroid glycosides, a study was made of the reactions taking place between deltonine ( $C_{45}H_{72}O_{17}$ ) derived from *Dioscorea deltoidea* and the bacterial membranes in *Micrococcus lysodeikticus*. Deltonine's bacteriostatic effect was assessed as the minimum concentrations of the preparation capable of slowing culture growth for a broad range of microorganisms including *Staphylococcus aureus*, hemolytic *Streptococci*, the diphtheria bacillus, *Pseudomonas aeruginosa*, *Salmonella*, *Shigella*, *E. coli*, *Micrococci* and three species of phytopathogenic bacteria, namely *Ps. syringae*, *Xs. campestris* and *Erw. carotowora*. Disruption of membrane integrity was evaluated on the basis of changes in the optical density of the protoplast suspension when acted upon by deltonine and by decrease in protoplast endogenous respiration. It was found that deltonine caused a synchronous decrease both in protoplast light scattering and endogenous respiration in concentrations above  $2 \cdot 10^{-5} M$  in intact protoplasts, indicating a breakdown of the protoplast membrane, that is, deltonine acts as a surface-active agent on the bacterial nonsteroid membrane. At concentrations of  $4 \cdot 10^{-5}$  to  $4 \cdot 10^{-4} M$  deltonine fragments the membrane, with splitting of the dehydrogensae fragments, leading to cessation of all activity in the respiratory chain and the slowing of oxidase activity. It is concluded that deltonine is a primary membrane compound, that is, a compound that acts on the membrane in vitro; and that the antibiotic activity of the steroid glycosides is not restricted only to fungi but also affects phytopathogenic bacteria and cocci, thus enlarging ideas about the protective function of the saponins in plants. Figures 3; references 14: 12 Russian, 2 Western.

[1517-9642]

UDC 576.809.518 + 616.778

ANTIFUNGAL AND ANTIMICROBIAL ACTIVITY OF SOME DERIVATIVES OF BETA-IONONE AND VITAMIN A

Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 19, No 6, Nov-Dec 83 (manuscript received 26 May 83) pp 795-803

MIKHLIN, E. D., RADINA, V. P., DMITROVSKIY, A. A., BLINKOVA, L. P. and BUTOVA, L. G., Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences, Moscow; Moscow Scientific Research Institute of Vaccines and Sera imeni I. I. Mechnikov, USSR Ministry of Health

[Abstract] The antifungal and antimicrobial activity of beta-ionone compounds and derivatives (citral, pseudoionone, aldehyde C<sub>14</sub>, ketone C<sub>18</sub>, 4,18-diketone, semicarbazide ketone C<sub>18</sub>, alcohol C<sub>18</sub>) and vitamin A and its derivatives (retinol, vitamin A acetate, retinal, retinoic acid) were studied in *Fusarium solani*, *Botrytis cinerea* and *Verticillium dahliae* (antifungal activity) and *Staphylococcus aureus* 209P (Oxford), *Streptococcus pyogenes* FF-38, *Micrococcus luteus* 2665, and strains of *Staphylococcus aureus* isolated from pyoderma patients (antimicrobial activity). In general, antifungal activity was shown to be a function of the structure of the cyclic part of the compound and the polyenoic chain. Phytopathogen growth was best inhibited by ketone C<sub>18</sub>, which suppressed growth in up to 100% of organisms at concentrations of 0.05% to 0.005%, closely followed by alcohol C<sub>18</sub>. *Fus. solani* and *Botr. cinerea* were the most sensitive organisms with respect to retinol, and *Botr. cinerea* and *Vert. dahliae* to retinal. Ketone C<sub>18</sub>'s antibacterial activity was seen against all organisms tested. Alcohol C<sub>18</sub> exerted a much weaker antibacterial effect, seen in only four strains, namely *Staph. aureus* No 1/2 (from pyoderma patients), *Staph. aureus* 209P, *Micrococcus luteus* 2665 and *Streptococcus pyogenes* FF-38 at alcohol concentrations of 5 milligrams per liter. Figures 2; references 18: 12 Russian, 6 Western.

[1517-9642]

UDC 547.898

ADVANCES AND NEW TRENDS IN CHEMISTRY OF SYNTHETIC MULTIDENTATE MACROCYCLIC COMPOUNDS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 9, No 11, Nov 83 (manuscript received 31 Jan 83) pp 1445-1482

BOGATSKIY, A. V., Physicochemical Institute, Ukrainian SSR Academy of Sciences, Odessa

[Abstract] A review is presented of the synthetic multidentate macrocyclic compounds, including their chemistry, physiological effects, and applications in technical processes. Coverage is given to new synthetic approaches,

structural studies in relation to function, immobilization on polymeric carriers, and behavior as anionic ligands, chiral molecules and uses in the separation of radioisotopes. In addition to their use in various chemical reactions and processes, emphasis is also placed on the antimicrobial and antiparasitic properties of selective macrocycles, and their interactions with and function within bilayer lipid membranes and biological membranes. The final topic covers the effects of such compounds on various crop plants, particularly as they affect germination and the development of various tissues. Figures 1; references 188: 32 Russian, 156 Western.  
[1519-12172]

UDC 577.152.314'1

BbvII:NOVEL SITE-SPECIFIC ENDONUCLEASE FROM BACILLUS BREVIS 80

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 9, No 11, Nov 83  
(manuscript received 3 May 83) pp 1578-1580

BUNINA, Z. F., KRAMAROV, V. M., MAZANOV, A. L., PACHKUNOV, D. M. and SMOLYANINOV, V. V., All-Union Scientific Research Institute of Applied Microbiology, Serpukhov City, and MATVIYENKO, N. N., Protein Institute, USSR Academy of Sciences, Pushchino, Moscow Oblast

[Abstract] Details are presented on the isolation and studies on a novel endonuclease isolated by gel filtration on AcA-34 and heparin-Sepharose from *Bacillus brevis* 80. Designated BbvII and tested on DNA molecules derived from bacteriophages pBR322 and  $\phi$ X174, BbvII was shown to cleave double stranded DNA molecules adjacent to the 5'-GTCTTC-3'  
3'-CAGAAG-5' site. Figures 1;

references 7: 1 Russian, 6 Western.  
[1519-12172]

INTERACTION OF SODIUM IONS WITH POTASSIUM CHANNELS IN MOLLUSK NEURON SOMATIC MEMBRANES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 276, No 4, Jun 84  
(manuscript received 2 Dec 83) pp 973-976

MAGURA, I. S., PREVARSKAYA, N. B. and DUB, V. A., Institute of Physiology imeni A. A. Bogomolets, UkrSSR Academy of Sciences, Kiev

[Abstract] The goal of this work was to study the interaction of sodium ions introduced into the neurons with potential-dependent potassium channels of the somatic membrane of mollusk neurons. Information obtained could be used in elucidation of the mechanisms of ionic transport across the potassium channels of this type. The effect of sodium ions on potassium current depended on their concentration in the cells, on the potential, depolarization level at which the current was registered and on the concentration of potassium ions in external solution. A different type of intracellular sodium ion blocking was observed for the inactivated and non-inactivated potassium current when instantaneous volt-ampere properties were compared (obtained from the registration of current "tails"). Increased concentration of external potassium ions shifted the negative range of volt-ampere function to the right along the potential axis, corresponding to the change in potassium equilibrium potential. This could be viewed as a proof of the interaction of potassium ions penetrating into the channels from the outside with the sodium ions. Potential dependence of the blocking of non-inactivating potassium channels with intracellular sodium ions led to the conclusion that the interaction of sodium ions with the channels occurs near the internal aperture of the channel and that the selective filter of potassium channel is closer to the surface. Figures 3; references 8: 2 Russian, 6 Western (1 by Russian authors).

[729-7813]

ISOLATION AND RECONSTRUCTION OF GLUTAMATE RECEPTORS IN BILAYER LIPID MEMBRANES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 276, No 4, Jun 84  
(manuscript received 28 Oct 83) pp 977-979

TASHMUKHAMEDOV, B. A., MAKHMUDOVA, E. M., USMANOV, P. B., KAZAKOV, I.  
and ATAUKIYEV, B. U., Institute of Biochemistry, UzSSR Academy of Sciences,  
Tashkent

[Abstract] One of the difficulties in studying glutamate receptors is the absence of specific neurotoxins blocking glutamatergic synapses. It was discovered that Araneidae spiders contained in their venom toxins which blocked postsynaptic membranes of the nerve-muscular compounds of the insects. By means of Sephadex G-100 gel chromatography followed by Biogel P-4 a fraction of neurotoxin of this spider was isolated and used as a ligand in preparing an affinity column based on polyamide. As the starting fraction of rat brain synaptosomes, the supernatant obtained from precipitation of a homogenate at 250 G was used. Two protein fractions ( $F_1$  and  $F_2$ ) were obtained and studied on bilayer lipid membrane (BLM). The  $F_1$  fraction induced conductivity in BLM in presence of  $Na^+$  and  $K^+$  ions, which increased with increasing concentration of protein. Fraction  $F_2$  which was eluted at lower pH caused no changes in BLM properties. Introduction of  $10^{-5}$  to  $10^{-4}$  M glutamate led to increased conductivity of BLM modified by either fraction. This effect did not show up during application of adrenaline. In addition, a glutamate receptor was isolated and reconstructed from the nerve-muscular synapses of fresh water crabs *Potamon transcaspium*. It exhibited characteristics analogous to those found above with neuroreceptors of rats and insects. Figures 4; references 5: 3 Russian, 2 Western.  
[729-7813]

NEW CLASSIFICATION METHOD OF INTERACTIONS IN MIXED CULTURES OF MICROORGANISMS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 276, No 3, May 84  
(manuscript received 10 Jan 84) pp 746-749

DEGERMENDZHI, A. G. and TERSKOV, I. A., academician, Institute of Biophysics,  
Siberian Department, USSR Academy of Sciences, Krasnoyarsk

[Abstract] New interaction criteria were formulated "adapted" to real models which described adequately structural dynamics of simple microbial systems. The general model of numerical dynamics of microorganism populations in chemostatic cultivation system was used as the basis for this study. Using the concepts of growth acceleration (as well as of mortality) made it

possible to carry out a more strict classification of interactions in real microorganism populations and to observe the dynamics of the interaction in the course of succession. The developed coefficients of interaction and selfregulation determine conditions for the stability of the species composition in the system. Positive reverse link in the monoculture leads to diminishing fluctuations in the numbers of a single population and to the concept of lower threshold. The prevalence of the factors over species leads to the dependence of the interaction types on the incoming currents. Figures 1; references 6: 5 Russian, 1 Western.

[728-7813]

## BIOTECHNOLOGY

### BIOENGINEERING APPLICATIONS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 29 Jun 84 p 2

[Article by Hero of Socialist Labor, Academician A. Bayev: "Bioengineering: Ways for Practical Applications"]

[Text] The 16th Conference of the Federation of European Biochemical Societies and the "Biochemistry-84" international exhibition will open tomorrow in Moscow. Scientists and specialists from almost 40 countries will be participating in this scientific forum and exhibit of instruments, equipment, and reagents for modern biochemistry. More than 2,000 papers and scientific communications will be discussed within the framework of 21 topical symposia of the conference.

Biochemical research has been successfully developing throughout the world over the last decades and has led to many important discoveries. The need for organizing regular contacts between biochemists of various countries to exchange information and to identify the most promising areas of research has also become apparent. With this purpose in mind, the Federation of European Biochemical Societies was organized in 1964 and the forthcoming conference will observe its twentieth anniversary. It was no accident that the capital of our country was chosen as the site for the biochemists' meeting. In giving considerable attention to new scientific directions, the CPSU Central Committee and USSR Council of Ministers have adopted the decree "On the Further Development of Biophysico-Chemistry and Bioengineering and the Utilization of Their Achievements in Medicine, Agriculture, and Industry." Today this area of science is a comprehensive multi-faceted field of scientific-technological progress that encompasses such sub-fields as microbiological synthesis in its broadest sense, and genetic and cellular engineering.

Bioengineering is already being successfully utilized in a number of industrial sectors. For example, with the help of special methane-releasing bacteria, the pressure in a petroleum bed can be increased for obtaining a more complete extraction of petroleum. Microorganisms have also been put to use for enriching ores in short supply, particularly, copper.

Experiments that employ bacteria are being widely conducted in coal mines to control gas accumulation.

Modern technology is opening up broad opportunities for solving urgent food supply problems, the control of serious diseases, and protecting the environment against industrial pollution. It is making it possible to devise systems based on new principles that utilize patents of nature.

Take, for example, the biological fixation of atmospheric nitrogen, which is such an important problem for industry, agriculture, and environmental conservation. There is a natural symbiosis between certain plants such as peas, soybeans, and alfalfa and rhizo bacteria that assimilate nitrogen directly from the air and convert it into nutritive substances which are furnished to plants. Bioengineering methods in principle make it possible to create nitrogen-fixing systems for "servicing" wheat, rice, sugar beet, corn, and vegetable crops.

The importance of this problem is exceptional. Modern chemical production of fertilizers has grown into a gigantic and costly industry which consumes an enormous amount of energy and non-renewable natural gas resources. At the same time, the intensive utilization of nitrogen-containing fertilizers has been leading to the pollution of reservoirs and the atmosphere, and has been disrupting the ecological balance. The utilization, on the other hand, of biological nitrogen fixation instead of fertilizers will signify a transition to an economically and more ecologically advantageous industrial technology of agricultural production.

Genetic engineering plays a decisive role in the resolution of this problem. The living cell is, after all, essentially nothing other than a small chemical factory where all production is subordinated to a hereditary program that is contained in one of its nucleic acids--DNA. Responsible for the fulfillment of the "production plan" are gene units each of which directs the manufacture of a specific product, usually a protein. It is therefore understandable that by intervening in the existing genetic program by introducing new genetic information into the cell in the form of a DNA molecule, the researcher is able to produce an organism that has been altered in accordance with a previously formulated purpose.

Biochemistry has given us the instrument for such delicate operations. Having broadened our knowledge about the workings of a live cell, biochemistry has made possible the industrial use of the cell's biological catalysts--enzymes. In the presence of such enzymes, chemical reactions proceed billions of times faster, without high temperatures or pressures. In addition, the action of enzymes is highly specific. Each one of them transforms only specific compounds and only in the necessary direction.

The making of synthetic genetic structures became technically feasible after such enzymes, present in all living cells, were isolated and purified. And that which in nature comprises a privilege of the integral organism, in the laboratory became an operation performed on the cellular and molecular level. For example, we have already produced insulin, a hormone secreted by the

pancreas, that is essential to the treatment of diabetics. The synthetic hormone corresponds to human insulin in structure. But it is produced by organisms that have been taught "to operate" according to a new genetic program.

The molecular hybridization laboratory is making it possible to overcome those cross breeding barriers that nature created in order to prevent the mixing of biological species. In this regard, biochemistry has its own special role. It is not enough to find in the microworld or to create microorganisms that efficiently produce any one particular substance. It is, also, essential to adapt the bacterial cell to industrial mass production conditions. This requires a profound understanding of the mechanisms that underlie the growth control of microorganisms and a knowledge about the factors that influence their development.

Thanks to this kind of research, bioengineering now can produce physiologically-active substances of protein origin for medicine and agriculture. One must, first of all, mention here the work on the production of a universal anti-viral preparation--interferon--which is one of the many proteins in the human body. It manufactures cells in response to viral infection. Moreover, each organism produces its own interferon. Therefore, only human interferon is suitable for the treatment and prevention of illness in humans.

The efforts of several scientific institutions, under the supervision of the Institute of Bioorganic Chemistry, USSR Academy of Sciences, have been consolidated in the work being done on this problem. Bacterial strains have been produced in the Institute's laboratories that contain the genes which control the synthesis of interferon. Further research has led to the production of hybrids of natural interferons. Consequently, industrial bacterial strains have been "designed" which produce that valuable medicinal.

Genetic engineering methods have also produced the very important growth hormone. The source material for that hormone was the pituitary, a gland of internal secretions. The human growth hormone gene was isolated from that gland at the Institute of Molecular Biology, USSR Academy of Sciences. Subsequently, researchers built it into a more complex structure and introduced it into bacteria. Finally, an experimental preparation of growth hormone was produced on equipment at the Institute of Biochemistry and Microorganism Physiology, USSR Academy of Sciences.

Of exceptional interest for the national economy are the methods of so-called cellular engineering where distinct progress has also been made. Scientists have discovered a unique capability of plant cells to yield a whole plant in the form of a culture which can be replanted into the ground where it will develop in the normal manner.

With respect to the future this method is suitable for selecting new species. It will not only accelerate the selection process but will also add new possibilities to it. Laboratory experiments have shown that it is possible to create genetically-mutated plants as well. The cultivation of planting

material of newly created species of grapes, potatoes and sugar beet that are disease-resistant is provided for within the framework of the "Bioengineering" scientific-target program.

Quite promising also is the use of plant cells for producing biologically active compounds which are essential to the food industry, medicine, and agriculture. An industrial formulation has already been prepared for producing ginseng tincture from cellular biomass.

Biochemistry is actively seeking inroads into engineering which it aspires to enrich with new technological principles. For example, microorganisms have been discovered that contain a protein which is similar to rhodopsin, a light-sensitive element of the retina. Investigations have shown that bacterial rhodopsin converts absorbed solar energy into chemical energy. The bacteria use the energy created in this manner for synthesizing substances which they require. It is possible that bacterial rhodopsin will be successfully used in helioengineering in the future.

There are other predictions as well. Inasmuch as rhodopsin, when activated by light, reversibly changes its color, this property might be utilized to make photochrome materials with exceptionally high resolution. Used as memory elements in computers, they would be capable of sustaining many cycles of recording and erasing optical information. The use of biological sources for energy production is also intriguing.

Research results on these and many other problems and ways slated for solving them will be among the subjects discussed at the conference that is about to open. One can say with confidence that the forthcoming exchange of ideas will serve as a new impetus to the development of biochemistry and the broad use of its achievements for the welfare of mankind.

6289  
CSO: 1840/738

UDC 577.15.8

ENZYME HYDROLYSIS OF ALBUMIN IN SYSTEMS WITH SOLID PHASES

Moscow PRIKLADNAYA BIOKHIKIYA I MIKROBIOLOGIYA in Russian Vol 19, No 6, Nov-Dec 83 (manuscript received 20 Sep 82) pp 783-787

RAKHIMOV, M. M. and KHASANOV, Kh. T., Central Asian Scientific Research and Design and Planning Institute for the Food Industry, Tashkent

[Abstract] Albumin enzyme reactions were studied in acid proteinase in the presence of solid phase components in order to clarify the effect of the nature of surface groups in the solid phases on the rate of proteolysis and to investigate the enzymatic properties of acid proteinase and compare the efficiency of various reactions in heterogeneous and homogeneous conditions. Acid proteinase produced by the microorganism *Aspergillus awamori*, and solid phase components consisting of Aerosil, aminoaerosil, nitrophenylaerosil, DEAE-cellulose (Reakhim) and a hydrophobic sorbent made up of polyamide with immobilized cephalin, were used in the work. It was found that following incubation with the selected sorbents, the acid proteinase was still capable of hydrolyzing water-soluble albumin, but that the reaction rate was altered depending on the nature of the sorbent, the sequence in which reagents were added to the reaction medium, the pH of the medium, buffer molarity, and temperature. In general, proteinase affinity to the substrate was greater in heterogeneous than homogeneous conditions. It is shown that the rate of the enzyme reaction can be controlled by initial processing of the solid phase with various agents; details and examples are given. Temperature is a major factor in varying reaction rates. Although the question of why reaction rate increases under the experimental conditions described remains open, it is concluded that the data obtained in this experiment will enable improvements in a number of biotechnical processes involving enzyme reactions. Figures 2; references 9; 8 Russian, 1 Western.  
[1517-9642]

ECOLOGY

UDC 577.472: 591.524.1(289)

RESULTS FROM STUDY OF SELF-PURIFICATION ABILITY OF BUFFER POOLS AT  
FERROUS METALLURGY ENTERPRISES

Sverdlovsk EKOLOGIYA in Russian No 2, Mar-Apr 84  
(manuscript received 5 May 83) pp 37-43

BAGNYUK, V. M., Institute of Botany imeni N. G. Kholodnyy, Ukrainian  
SSR Academy of Sciences

[Abstract] A comprehensive study was made of buffer pools used at enterprises in ferrous metallurgy for the discharge, settling, cooling, dilution and natural stabilization of production effluent in order to investigate the algal and bacterial communities present in terms of specific makeup and density of phytoplankton, including functional groups of bacteria responsible for the oxidation of petroleum products, phenols, cyanides and rhodanides, and measurement of integral values for self-purification in buffer pools in terms of the main pollutants present in effluent from coking and chemical and metallurgical production. The study was conducted at two such series of buffer pools over the period 1972-1978 at two metallurgical plants, one in the South Urals and one in the Ukraine. At the South Urals buffer pools 33% of petroleum products, 22% of phenol compounds, 34% of cyanides and 31% of rhodanides were broken down each day. These processes took place much more slowly at the Ukrainian pools because of adverse ecological conditions (the large area of the petroleum film on the water surface, the water's high turbidity and lack of dissolved oxygen). The self-purifying ability of biocenoses present in the pools varied between 14.6% and 19.1%, with the higher values found during the warmer parts of the year. Details are given of the presence and activity of *Bacillariophyta*, *Chlorophyta*, *Cyanophyta*, *Euglenophyta*, *Pyrrrophyta* and *Chrysophyta*. Activation of phosphates in pools at the ferrous metallurgy enterprises was very sluggish because of factors associated with the physicochemical bonding of the phosphates. It is concluded that self-purification of pools can be boosted by regulating the contents and ratios of oxygen, nitrogen and phosphorus in the water in order to intensify the biological processes taking place in the phytoheterotrophic biocenoses studied. Figures 2; references 28: 25 Russian, 3 Western.

[1065-9642]

UDC 630.54: 661.879

BACKGROUND CONCENTRATIONS OF  $^{226}\text{Ra}$ ,  $^{228}\text{Th}$  AND  $^{40}\text{K}$  IN ARABLE LAND AND AGRICULTURAL PLANTS

Sverdlovsk EKOLOGIYA in Russian No 2, Mar-Apr 84  
(manuscript received 23 Aug 83) pp 47-52

DRICHKO, V. F. and LISACHENKO, E. P., Leningrad Scientific Research Institute of Radiation Hygiene

[Abstract] Background parameters are established for the frequency distribution of  $^{226}\text{Ra}$ ,  $^{228}\text{Th}$  and  $^{40}\text{K}$  in arable land and agricultural plants in the RSFSR according to the 1975 system of natural-and-agricultural zones. Results are shown in tabular form for the soil in the zones and for cereals and potatoes grown there. Mean concentrations for these radionuclides are close to the world means for concentration. Extensive sampling of cereals and soils showed that the distribution of concentrations of radionuclides studied is close to the logarithmic normal in terms of transfer from soil to plants. It can be expected that a similar picture will emerge for the soil-potato chain. Figures are shown for plant uptake of  $^{226}\text{Ra}$ ,  $^{228}\text{Th}$  and  $^{40}\text{K}$  from the soil and it is shown that direct correlation between the radionuclides does not exceed 0.2. However, linear correlation is shown, and on this basis criteria are established for assessing increased concentrations in the soil of arable land. The coefficients of linear and stepped dependencies between the concentrations of the radionuclides are analyzed. References 14: 12 Russian, 2 Western.

[1065-9642]

UDC 576.8

BACTERIOPLANKTON HETEROTROPHIC ACTIVITY IN LAKES OF MONGOLIA

Sverdlovsk EKOLOGIYA in Russian No 2, Mar-Apr 84  
(manuscript received 7 Apr 83) pp 52-57

BUL'ON, V. V., Zoological Institute, USSR Academy of Sciences

[Abstract] Using a radio-labeled carbon acetate method a study was made in the summer of 1980 of heterotrophic activity in plankton bacteria in 16 lakes located in Mongolia at altitudes ranging from 580 to 2,080 meters above sea level, with determination of the chlorophyll a concentrations. Calculations were based on the Michaelis-Menten kinetic equation for maximum rate of utilization of organic material. Values for maximum rate of utilization of organic material, natural concentration plus the half-life constant, and exposure time are shown in tabular form for the bodies of water studied. Concentrations of chlorophyll a varied widely between 0.35 and 240 micrograms per liter. Data are shown for heterotrophic activity of plankton bacteria in the lakes, which varied between 0.01-1.0 micrograms carbon per

liter and exposure times of 10 to 1,000 hours. It is shown that a clear feedback mechanism operates between heterotrophic activity and exposure time, and that a direct correlation exists between heterotrophic activity and the chlorophyll a, indicating the direct dependence of bacterial activity on the productiveness of the lakes. The data obtained are inadequate to stand on their own and further studies of heterotrophic activity of plankton bacteria are required to confirm the direct correlation between rate of use of the organic substrate and the chlorophyll a content. Figures 2; references 11: 4 Russian, 7 Western.

[1065-9642]

UDC 599.539.163

#### NEW METHOD FOR LABELING SMALL MAMMALS AND EXPERIENCE IN ITS USE

Sverdlovsk EKOLOGIYA in Russian No 2, Mar-Apr 84  
(manuscript received 10 Dec 83) pp 64-66

BAZHENOV, A. V., BOL'SHAKOV, V. N. and SADYKOV, O. F., Institute of Plant and Animal Ecology, Urals Scientific Center, USSR Academy of Sciences

[Abstract] A prenatal radio-labeling method used for tracking small mammals is described. The tagging procedure is carried out under field conditions by subcutaneous introduction of osteotropic  $^{90}\text{Sr}$  and  $^{45}\text{Ca}$  in adult females of the species under investigation at breeding sites. Best final results are obtained when females already pregnant are tagged. The Tesla, VAV-100 and UMF-1500 radiometers used to track labeled animals are effective across a 3-kilometer radius. The main advantages of the method are that it is not necessary to trap individual animals to be tagged (as in postnatal tagging) and all offspring will be tagged by introducing the radionuclide in the mother. The method was tested in 1980 under field conditions on Mount Iremel (1,586 meters above sea level in the Beloretskiy region of the Bashkir ASSR) in 99 female Clethrionomys. Results are described and discussed. The method is promising in studies of mammal populations to clarify the range of population borders and evolutionary ecology.

References 8: 7 Russian, 1 Western.

[1065-9642]

EXPERIMENTAL COMPLEX FOR RADIODECOLOGY MODELING

Sverdlovsk EKOLOGIYA in Russian No 2, Mar-Apr 84  
(manuscript received 25 Mar 83) pp 66-68

SHVEDOV, V. L., GOLOSHCHAPOV, P. V. and KORYTNYY, V. S.

[Abstract] Methodological and experimental work to resolve problems that occur when evaluating the long-term effect of ionizing radiation under natural conditions is discussed. A description is provided for a set of equipment and premises developed in order to solve the various methodological problems that arise when trying to obtain adequate information on this subject, including the design features of irradiation and dosimetry equipment, irradiation methods, and life-support systems for large numbers of experimental animals with reference to meeting sanitation and hygiene standards for personnel and the area surrounding the experimental area. The equipment consists of two independent premises, one for holding and irradiating subjects and one containing control equipment for shields and irradiators, an operating suite, and auxiliary quarters. The proposed layout of this complex is illustrated. Details of the dimensions and construction of such a complex for rats are shown. Results are shown from experiments conducted in one such layout for this complex. Figures 2; references 7 (Russian).  
[1065-9642]

METHOD FOR MASS ADMINISTRATION OF RADIONUCLIDES IN SMALL LABORATORY ANIMALS

Sverdlovsk EKOLOGIYA in Russian No 2, Mar-Apr 84  
(manuscript received 25 Mar 83) pp 69-70

SHVEDOV, V. L. and GOLOSHCHAPOV, P. V.

[Abstract] An attempt was made to develop a mass method for administering radionuclides to small laboratory animals per os by means of adding appropriate doses of a radionuclide to the animal fodder. Mechanical details of the method are described and the calculations are shown for  $^{90}\text{Sr}$  in rodents. The method has the advantages of ease and rapidity, reliable monitoring and minimum risk of contaminating cages and work areas. The disadvantages include the fact that doses are not administered on an individual basis. The question of statistical distribution of the radionuclides is discussed and empirical findings are described. It is shown that standard error using the method does not exceed 30%. However, the distribution function for the isotope in a population depends on the distribution function in the fodder ration and not on the level of activity, while dispersion of the biological constant does not introduce any significant changes in the form of  $^{90}\text{Sr}$  distribution in a rodent population. Comparison of calculated and

experimental findings shows complete agreement. The proposed method is therefore adequate for modeling long-term ingestion of substances. Considering the chemical properties of individual compounds, the method can also be used to study the long-term consequences of industrial products. Figures 1; references 5 (Russian).

[1065-9642]

UDC 591.505

#### CADMIUM AND POLONIUM-210 IN WOOL AND DROPPINGS OF HARE FROM VICINITY OF MELNIK ELECTRIC POWER STATION

Sverdlovs EKOLOGIYA in Russian No 2, Mar-Apr 84  
(manuscript received 9 Dec 82) pp 78-79

PAUKERT, J., Institute of Landscape Ecology, Czechoslovak SSR Academy of Sciences, Richany, near Prague

[Abstract] The problems of determining levels of cadmium and other heavy metal contamination in plants and animals as the result of industrial activity are discussed and the contradictory nature of findings is shown. Findings are presented from a study of wool and droppings from hares trapped in 1976 at distances of 3-4 kilometers from the Melnik Electric Power Station in Citov region and the adjacent forest of Horni Pocaply, Czechoslovakia. Analysis shows that the wool of animals trapped close to the power station contained an average of four times the amount of cadmium than controls. Droppings contained even higher amounts of cadmium than the wool, but represent only a one-time concentration, while the concentration in wool is indicative of long-term accumulation. Working with the Bulgarian Academy of Sciences Institute of Roentgenology and Radiobiology in Sofia, the author also made determinations of Po-210 in the wool of hares trapped in the same area. Concentrations of Po-210 varied between 11.2 and 15.8 picocuries per 100 grams. It is concluded that the hare can be used as a convenient biological index for the zone of contamination since it does not migrate from its own regular habitat and builds up accumulations of cadmium and Po-210 in the wool and droppings that can be easily determined. Changes occurring as the result of man's economic activities can be detected earlier than from data obtained from the human population, where phenomena such as migration, smoking and the ingestion of imported food confuse the picture.

References 8: 1 Russian, 7 Western.

[1065-9642]

RESPIRATORY COEFFICIENT IN BAYKAL HYDROBIONTS

Sverdlovsk EKOLOGIYA in Russian No 2, Mar-Apr 84  
(manuscript received 29 Jun 83) pp 79-81

KOLUPAYEV, B. I., Baykal Branch of the Institute of Ecological Toxicology

[Abstract] Values for the respiratory coefficient were determined in mollusks, amphipods and fish in Lake Baykal in water with an elevated temperature or a lowered oxygen content in order to investigate the ability of animal life in the lake to adapt to an anaerobic metabolism. Experiments were conducted in the mollusk *Benedictia baicalensis*, the amphipod *Eluimnogammarus verrucosus* and the fish *Phoxinus phoxinus*, all living in the offshore part of the lake at depths down to 10 meters. In mollusks living in water at temperatures of 5, 14, 18 and 22 degrees the respiratory coefficient did not exceed unity; in water with a reduced oxygen content (initial concentrations of 4.8-2.5 milligrams per liter) there was an increase in the value of the respiratory coefficient. These data indirectly indicate that short-term temperature fluctuations do not result in anaerobic-type respiration in mollusks. In amphipods, at temperature of 6, 12 and 18 degrees the respiratory coefficient had values below unity; in amphipods living in water at above 20° the respiratory coefficient was above unity. In fish in water at 8, 12 and 16 degrees the respiratory coefficient was less than unity; at above 20° (where minnows are not found under natural conditions) there was an increase in the respiratory coefficient, apparently resulting not only from elevated temperature but also oxygen deficiency. In contrast to mollusks, in amphipods and fish no involvement of anaerobic respiratory processes was observed in hypoxic conditions. The findings indicate that populations in Lake Baykal are capable of partially utilizing anaerobic processes in temperature overloads. In the mollusk *Benedictia* similar adaptations were seen only in hypoxic conditions. Anaerobic metabolism in the species studied is less efficient for supporting viability in extreme conditions than in palearctic species. It is concluded that although the species studied are capable of anaerobic metabolism, this type of respiration is observed only during the development of pathological processes. The limited effectiveness of anaerobic respiration is evidently one of the reasons for the limited ability of Baykal hydrobionts to adapt during environmental changes.

References 7 (Russian).

[1065-9642]

ENVIRONMENT

SECOND CONFERENCE OF YOUNG FAR EASTERN SCIENTISTS: BIOLOGICAL RESOURCES OF SHELF, THEIR RATIONAL UTILIZATION AND PROTECTION

Vladivostok BIOLOGIYA MORYA in Russian No 1, Jan-Feb 84 pp 65-66

KHOTIMCHENKO, Yu, S.

[Abstract] The Second Regional Conference of the Young Scientists of the Far East was held on September 5-7, 1983 in the settlement of Paratunka, in the vicinity of Petropavlovsk-Kamchatka. The meeting was entitled "Biological Resources of the Shelf, Their Rational Utilization and Protection", and organized by the Institute of Marine Biology of the Far Eastern Scientific Center, USSR Academy of Sciences, the Kamchatka Branch of the Pacific Scientific Research Institute of Fisheries and Oceanography, the Kamchatka Oblast Committee of the Komsomol, and the Kamchatka Oblast Scientific Technical Department of the Fisheries Industry. The conference was attended by 60 specialists representing Vladivostok, Petropavlovsk, and Southern Sakhalin, and was organized into four sections. One section of the Conference dealt with hydrobiology and ichthyology, another with marine population biology, the third with experimental biology, and the fourth concentrated on mariculture and embryology. The meeting was a welcome demonstration of basic science used to further practical applications, and was held at a very high level. Plans have been laid to hold the third conference in this series in Vladivostok in 1985.

[707-12172]

EPIDEMIOLOGY

UDC 616.98:579.852.13]-036.1

RARE FORMS OF BOTULISM

Moscow SOVETSKAYA MEDITSINA in Russian No 5, May 84  
(manuscript received 30 Sep 83) pp 62-64

NIKOFOROV, V. N. and NIKIFOROV, V. V., Chair of Infectious Diseases,  
Central Institute for the Advanced Training of Physicians, Moscow

[Abstract] A review of largely Western literature is presented on the rare forms of botulism, dealing essentially with those cases arising from wound contamination and the cases occurring in breastfed infants. The current thinking is that for wound-related cases of botulism the degree of necrosis must be sufficient to reduce the tissue redox potential to a level compatible with botulinum production. The infant cases present a more problematical situation. However, it appears, on the basis of the best available data, that infant botulism results from in vivo toxin formation following colonization of the GI tract by *C. botulinum*. American experts generally avoid antibiotics in such cases, since they feel that this might accelerate the breakdown of vegetative cells and enhance the toxemia. References 35: 6 Russian, 29 Western.

[710-12172]

## FOOD TECHNOLOGY

### PRODUCTION OF BETTER NUTRITIONAL FOODS URGED

Alma Ata KAZAKHSTANSKAYA PRAVDA in Russian 5 Jun 84 p 3

[Article by T. Sharmanov, academician of the USSR Academy of Medical Sciences: "New Products: Search and Problems"]

[Text] The role of the science of nutrition in resolving problems associated with the Food Program is being realized in several different ways. One of them is to establish the optimal quantity and proportion of food products that are consumed. Clarification of a balanced nutritional structure is important not only for the maintenance of public health, but also for the proper planning of food production, in particular animal husbandry products, especially dairy products as well as fruits and vegetables.

It has been established that the nutritional calorie intake in our country satisfies, and often exceeds, human requirements which, in combination with little physical exercise, leads to obesity on the part of many persons.

Specialists are particularly concerned about the quantitative regulation and quality of consumed carbohydrates. The fact of the matter is that the consumption of readily-available carbohydrate-containing substances, especially sugar, is steadily growing. This frequently leads to the disruption of metabolic processes, and to the development of diabetes and other diseases. Hence the necessity of substituting fructose and so-called yellow sugar for regular sugar.

Fruits, berries, and vegetables constitute a good source of carbohydrates that can be used by the body. In addition, they are rich in essential vitamins, minerals, and fiber whose role in the regulation of vitally important metabolic processes is difficult to overestimate. Their optimal content in the diet is an indispensable condition of rational nutrition. They also facilitate the body's effective assimilation of other food components, including proteins, resources of which are known to be comparatively limited.

The scientifically-substantiated vitaminization of a number of products and enrichment with certain trace elements also enhances their usefulness.

The search for new products and the effective utilization of traditional food products are doubtless becoming very important. The Institute of Nutrition of the Kazakh branch of the USSR Academy of Medical Sciences has conducted biomedical tests and has established good nutritive qualities of a number of new food sources, and has prepared recommendations for using waste products of the dairy and food industry. This particularly relates to new products from secondary dairy raw products that have a high nutritive value that are largely used at the present time for forage purposes.

The Kazakh branch has worked out a process for producing whey with the use of baker's yeast. All of its useful properties are retained and its biological value is increased. The production method is simple and comparatively inexpensive and at the same time makes it possible to improve the nutritive qualities of the cottage cheese produced in this manner. This kind of whey can be used for making pediatric, dietetic, and therapeutic products, and it, of course, is awaiting its introduction into the market. However, the republic's Ministry of the Meat and Dairy Industry is not ready to produce the whey.

The introduction of non-traditional food and food protein sources must constitute an essential contribution to the fulfillment of the Food Program.

Several years ago associates at the Branch studied the chemical composition, nutritive and biological value of meal and protein isolate from tomato seeds that were extracted by the Dzhambul Technological Institute. As a waste product of the fruit canning industry, those seeds number in the tens of thousands of tons in the country. Tomato meal is rich in proteins, lipids, vitamins and minerals. The addition of up to five percent of the product into baked bread increases the biological value of the product without changing its taste qualities. The protein isolate of tomato seeds can be used for enriching the amino acid composition of baked goods which would increase their availability. However, persistent attempts to put these results into practice through the offices of the Kazakh SSR Ministry of the Food Industry have so far met without success despite the obvious economic effectiveness of the suggestions made to that end.

Another example is cottonseed oil cake, a product obtained by extracting oil from cottonseed. Approximately two million tons of this product are produced in our country. According to the estimates of specialists, one could produce from that quantity about 200 thousand tons of pure protein with a fairly good amino acid composition. Chemists in Uzbekistan have developed a process for its production, and we have studied its nutritive properties. The conclusion is that the industrial production and the utilization of the cottonseed protein as an additive to certain traditional food products could yield an annual profit of two billion rubles for the country.

Unfortunately, not all of the technological aspects of producing the protein from the cottonseed cake have been sufficiently worked out for industry-wide operations since the complete removal of certain undesirable additives has not yet been successful. The solution of this problem requires the consolidation of efforts on the part of chemists, technologists, and

specialists in the nutrition field. Apparently, it would also be advisable to work out scientifically the task of incorporating protein from other oil-producing plants into food.

The manufacture of food products with greater biological value and designed for special purposes, particularly for pediatric nutrition, and the prevention and treatment of a number of diseases, constitutes an important direction on the part of scientists involved in the USSR Food Program.

Along with the pediatric products Baldyrgan and Balbobek, which already enjoy Union-wide recognition, Branch associates have developed a number of other specialized products that have a high level of biological activity. Among those products is multi-component additive for enriching dairy and other products. Its incorporation into cow's milk or vegetable juices permit making such products more balanced both with respect to the basic food substances, proteins, fats, and carbohydrates, and with respect to the biologically active ingredients--vitamins, enzymes, and trace elements. The manufacturing process for the additive is simple, and the product is conveniently transported and stored. It can be supplied to the most remote regions of the republic. However, mass production of the product has not yet been accomplished. Moreover, the decision as to which department should be responsible for this has not yet been made. What is obviously necessary here is a coordinated effort on the part of the republic's Ministry of the Meat and Dairy Industry Ministry of Health.

One should also touch upon the important problem of food product storage. Study has begun at the Uranch on a new film-forming compound to cover poultry carcasses and fruits. The compound was developed by the Institute of Chemical Sciences, Kazakh SSR Academy of Sciences. According to preliminary figures, its use by the Alma-Ata Meat and Poultry Association alone as a film cover, will yield an annual saving of 250,000 rubles. Other investigations of this kind that are of national economic significance will be undertaken in the near future.

Unfortunately, the industrial production of new products with greater biological value and for specialized, therapeutic, and prophylactic purposes, entails quite a few difficulties. For some reason or other, the ministries of the meat-dairy, fruit and vegetable, and the food industry under whose authority the introduction of these products lies, are now showing genuine interest in this endeavor. That is to say, that this is a troublesome matter. But at the same time it is quite obvious that without close cooperation between these departments and nutrition specialists there can be no successful resolution of the problem of mass-producing products that are so essential for the public.

It is high time to organize, in Kazakhstan, an experimental industrial base for joint operations between the Institute of Nutrition and the Research Institutes of the Meat and Dairy and Fruit and Vegetable Industries. This would make it possible to coordinate at the experimental level the manufacture of the products under development and the industrial potential to introduce those products on a broad scale.

UDC 613.2:577.16]:[664:339]:008(47+57)

USSR FOOD PROGRAM AND VITAMIN ENRICHMENT OF FOOD PRODUCTS

Moscow VOPROSY PITANIYA in Russian No 1, Jan-Feb 84  
(manuscript received 7 Jul 83) pp 3-7

SPIRICHEV, V. B., Institute of Nutrition, USSR Academy of Medical Sciences, Moscow

**[Abstract]** The USSR Food Program has placed new emphasis on improving the vitamin content of the Soviet diet. Although current Soviet nutrition is considered to be sufficient in basic components, and even excessive in view of observed frequency of obesity, vitamin balance is lacking and results in various illnesses related to such deficiencies. Labor productivity and possible malignancies are also cited as related to vitamin deficiencies. Losses of vitamin content during food processing, reduced energy needs due to labor saving mechanization and automation, and other factors must be considered in determining needs for enrichment of bread flour and other provisions for proper vitamin content. Currently, only 18% of Soviet flour is so enriched, and the various ministries that must take active roles in increasing vitamin supplements in various forms are not doing enough. State standards for vitamin content, as well as other food value criteria, are recommended in order to improve public health.

[715-12131]

UDC 613.295:613.288:591.524.12(26)

EFFECT OF STORAGE AND HEAT PROCESSING ON COMPOSITION OF FATTY ACIDS IN ANTARCTIC KRILL EUPHAUSIA SUPERBA

Moscow VOPROSY PITANIYA in Russian No 1, Jan-Feb 84  
(manuscript received 11 Mar 83) pp 71-73

MEDVEDEV, F. A., ARTYUKOVA, O. A., MANASOVA, P. A., and LEVACHEV, M. M., Institute of Nutrition, USSR Academy of Medical Sciences, Moscow; Vladivostok Medical Institute

**[Abstract]** Antarctic krill is regarded as a promising source of nutrition, with excellent protein and 2-10% lipids including polyunsaturated fats as

more than 1/3 of total fatty acids. The present article reports on the effects of frozen storage and primary heat processing with subsequent freezing on the composition of these fatty acids, compared to those extracted from fresh krill. Lipids were extracted from the three variants with a chloroform-methanol mixture, and identified by mass-chromato-spectrometry. Previously unknown fatty acids from krill and positional isomers of unsaturated fatty acids will be the subject of a later article. The results indicated that no marked differences between fresh fatty acids and frozen ones could be discerned, but in cooking some of the lighter saturated acids were lost and the amount of palmitic acid increased. The technological processes used did not reduce food value. Figures 1; references 11: 4 Russian; 7 Western.  
[715-12131]

UDC 612.39

#### SIGNIFICANCE OF PHYSIOLOGY AND TROPHOLOGY IN RESOLVING APPLIED PROBLEMS OF NUTRITION

Moscow IZVESTIYA AKADEMII NAUK SSSR. SERIYA BIOLOGICHESKAYA in Russian  
No 1, Jan-Feb 84 (manuscript received 14 Jan 83) pp 5-17

UGOLEV, A. M., Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad

[Abstract] Achievements of biology have contributed to knowledge of the physiology and biochemistry of food assimilation; that knowledge is essential to achieve the goals of the USSR Food Program, particularly in correcting errors in food production that have contributed to high levels of carbohydrates in the Soviet diet. The present article discusses depolymerization and transformation (digestion) of food substances into useful forms, and food absorption in both extracellular and cellular processes. Traditional balanced diet perceptions have given way to understanding of limitations imposed by growth, evolution, and illnesses related to diet. The importance of fiber in the diet has also been given more attention. Thus, new factors are being considered in attempting to establish an adequate diet for Soviet citizens. Other important factors studied have included endogenous physiologically-active substances, nutrients modified by microflora of the intestinal tract, products of the life cycle of bacteria, and ballast substances such as monosaccharides and volatile fatty acids modified by bacterial flora. Comparison of the advantages of animals possessing sufficient intestinal microflora over those with sterile states show that bacterial flora are a trophic hemostat that takes care of the breakdown of excess food components and the formation of products that are lacking. Problems of high osmotic activity are discussed. Protein loss and the development of a negative nitrogen balance are related directly to stress through insufficient amino acid assimilation. Finally, the new science of trophology is outlined. References 39: 11 Russian, 28 Western.

[689-12131]

CERTAIN ECONOMIC PROBLEMS IN REALIZATION OF USSR FOOD PROGRAM

Moscow IZVESTIYA AKADEMII NAUK SSSR. SERIYA BIOLOGICHESKAYA in Russian  
No 2, Apr-May 84 (manuscript received 14 Jun 83) pp 289-294

KANTOROVICH, L. V., All-Union Scientific Research Institute for Systems  
Studies, Moscow

[Abstract] Measures in the USSR Food Program constitute a major political and economic action that should be decisive in advancing agricultural production. Some of the problems faced in realizing the goals of the program are related to the lack of personal feelings of involvement and other economic conditions that are crucial for successful progress. Major contributions are expected from mathematical modeling and computer programming. Agriculture is particularly suitable for data processing approaches in registering production and reserves. Economic considerations have not previously received sufficient weight in making agricultural decisions. Domestic natural resources can also be put to better use. Another area requiring better solutions is pricing. Unified pricing standards that take account of a product's place in the overall plan and specific agricultural costs that can be compared to industrial cost accounting are needed. The interests of the national economy, purchase prices in relation to economic restraints intended to level the positions of agricultural organizations throughout the country, measures that encourage intensive methods of production and stimulative purchase prices require attention. Rent payments are also discussed as a factor in figuring agricultural costs and establishing prices. Since rental payments are not related to production, they represent a powerful incentive for agricultural production. References 5 (Russian).

[690-12131]

OCEAN SURPRISES

Moscow SOVETSKAYA ROSSIYA in Russian 8 Jul 84 p 2

BELEVSKAYA, Z., interviewer

[Abstract] An interview is reported with the Deputy Minister of Fisheries, A. N. Gul'chenko concerning the current state of sea fishing. Stress has been placed on the need for enlarging the varieties of fish products, as the industry moves away from shore-line fishing towards deep sea operations. The idea is to develop new tastes among the consumers and to increase awareness of the new types of fish products which are now available on the market. Specialized stores are appearing on the consumer market, devoted to popularization of new fish products. In addition, modern advertising, packaging with instructive and descriptive inserts and specialized booklets should enlarge public appreciation of the new fish products.

[735-7813]

GENETICS

UDC 575.224:579.252.5

INDUCED MUTAGENESIS OF PLASMIDS AND CHROMOSOMAL GENES INSERTED INTO PLASMID DNA. REPORT 1. MUTAGENIC EFFECT OF IRRADIATIONS

Moscow GENETIKA in Russian Vol 20, No 4, Apr 84  
(manuscript received 7 Apr 83, final draft received 24 Jun 83) pp 533-541

YESIPOVA, V. V., VEDUNOVA, S. L. and KРИVISKIY, A. S., All-Union Scientific Research Institute of Genetics and Selection of Commercial Microorganisms, Moscow

[Abstract] Genetic effect of ultra-violet and gamma radiation on isolated, multicopy plasmid RSF 2124 are described and discussed with DNA of RSF 2124, which determines colicine E<sub>1</sub> synthesis and resistance to ampicillin as a model. Mutagenic effect was calculated by the rise of Col<sup>r</sup> mutants incapable of synthesizing colicine. Lethal effect was determined by inactivation of ampicillin marker. After re-isolation of plasmid DNA from the mutant transformant, the new character and resistance to ampicillin remained during subsequent transformations and re-sowings of transformed colonies, indicating the mutational nature of the changes produced. Short-wave ultra-violet irradiation ( $\lambda = 245$  nm) of DNA of RSF 2124 produced a clear-cut mutagenic effect and the relative quantity of Col<sup>r</sup> mutants increased almost 10-fold under optimum conditions of mutagenesis. W-reactivation (additional ultra-violet irradiation of recipient C600 wild type cells) of lethal injuries produced 95 percent amplification of mutagenic effect. Increase of quantity of Col<sup>r</sup> mutants after indirect mutagenesis, when only bacterial cells of the recipient are irradiated, indicates that plasmid DNA in this case, as in the case of W-reactivation, responds as does DNA of moderate phages, which confirms their evolutionary proximity. Treatment by acridine orange before ultra-violet irradiation provided protection only from lethal injuries. Gamma irradiation with  $^{60}\text{Co}$  with inactivation of approximately  $10^{-2}$  increased Col<sup>r</sup> mutants by one order of magnitude. Presence of the plasmid in a cell does not affect its ultra-violet sensitivity. Figures 6; references 13: 6 Russian, 7 Western.

[1509-2791]

UDC 575.1:595.773.4

BIOCHEMICAL POLYMORPHISM IN DROSOPHILA IMERETENSIS SOKOLOV (DROSOPHILA LITTORALIS MEIG.) IN NATURAL POPULATIONS OF KRASNODAR KRAY

Moscow GENETIKA in Russian Vol 20, No 4, Apr 84  
(manuscript received 27 May 82, final draft received 17 May 83) pp 620-627

GONCHARENKO, G. G., MITROFANOV, V. G. and KATOKHIN, A. N., Gomel State University; Institute of Cytology and Genetics, USSR Academy of Sciences, Siberian Department, Novosibirsk; Institute of Developmental Biology imeni N. K. Kol'tsov, USSR Academy of Sciences, Moscow

[Abstract] Genetic structure of *Drosophila imeretensis* populations according to biochemical loci is described and order of disposition of biochemical loci in the short arm of chromosome 2 and possibility of coupling imbalance between alleles found in chromosome 2 and inversion 2 t are established and described. Biochemical polymorphism is not associated with permanent inversion heterozygosity in the *D. imeretensis* populations. In spite of the fact that heterozygotes in standard order and inversion 2 t are subjected to strong selection which destroys half of the individuals in the population even before the imago stage, such parameters as heterozygosity, fraction of polymorphic loci and mean number of loci are the same as those in populations of other polymorphic species not having a balanced lethal system. Figures 5; references 17: 4 Russian; 13 Western.

[1509-2791]

UDC 575.2.23

MUTAGENIC ACTIVITY OF N-NITROSOETHYLENE UREA IN HIGHER PLANTS

Moscow GENETIKA in Russian Vol 20, No 4, Apr 84  
(manuscript received 20 May 83) pp 646-653

SAL'NIKOVA, T. V., GRIGOROVA, N. V., LAPUTIN, D. L., SHUSTOVA, L. L., ZAZIMKO, V. V., SHUSTOV, G. V., and KOSTYANOVSKIY, R. G., Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] Cytopathogenetic effect of N-nitrosoethylene urea (NETM) on common wheat and *C. capillaris* L. are studied. Air-dried wheat seeds were treated with 1 of 5 concentrations (0.1-0.01 percent) of NETM for 18 hours at pH 5.7 or 7.0. Treatment of seeds with NETM reduced the germinating power significantly at pH 5.7, especially at high concentrations of NETM. NETM is also a highly effective chemical mutagen. Maximum mutagenic effect appears at pH 7.0. NETM greatly reduced mitotic activity of wheat and *C. capillaris* L. which is typical for alkylating type mutagens. The aberration rate is rather high for both objects studied. In both the anaphase and metaphase method of calculating chromosomal injuries, a great percentage of the total number of aberrations are chromatid type reconstructions

which indicates predominance of the alkylating action of NETM. Wheat affected by NETM has a large number of anaphase cells with lagging chromosome which is atypical for alkylating type mutagens. This may be explained by the effect of NETM on centromeric and precentromeric parts of chromosomes and spindle filaments. NETM is an alkylating agent rather than a carbamoylating agent. It is a highly active and slightly toxic mutagen. Figures 1; references 25: 17 Russian, 8 Western.  
[1509-2791]

UDC 575.113:633.11

COMBINATION CAPACITY OF VARIETIES OF SOFT SPRING WHEAT ACCORDING TO UTILIZATION OF NITROGEN IN FERTILIZERS

Moscow GENETIKA in Russian Vol 20, No 4, Apr 84  
(manuscript received 6 Jun 83) pp 655-661

GAMZIKOVA, O. I., KALASHNIK, N. A., GAMZIKOV, G. P. and KOLMAKOVA, I. R., Institute of Soil Science and Agrochemistry, USSR Academy of Sciences, Siberian Department, Novosibirsk; Siberian Scientific Research Institute of Agriculture, Omsk

[Abstract] Variability, nature of succession and combinative capacity of soft spring wheat according to utilization of fertilizer nitrogen are considered in a study of 5 varieties and 20 intervarietal hybrids produced according to the complete diallel scheme. Selection of genotypes having a high coefficient of utilization of fertilizer nitrogen is very difficult, especially in early generations of hybrids. Gene carriers, which improve the characteristics studied, may be Saratovskaya 29 and Omskaya 9 and the latter variety is more preferable because of transmission by hybrids of the property of reduced accumulation of  $^{15}\text{N}$  in the vegetative part. It is assumed that mechanisms of utilization of fertilizer nitrogen in Saratovskaya 29 are associated basically with features of development of the root system and, in variety Omskaya 9, with specifics of total accumulation of the biomass. References 22: 15 Russian, 7 Western.

[1509-2791]

UDC 575.591

TASTE SENSITIVITY TO PHENYLTHIOPHARMACIDE AMONG WEST KAZAKHSTAN POPULATION

Moscow GENETIKA in Russian Vol 20, No 4, Apr 84 (manuscript received 20 Apr 83)  
pp 702-704

KASENOV, K. U., Department of Pathological Physiology, Aktyubinsk State  
Medical Institute

[Abstract] Study of taste sensitivity to phenylthiopharmacide (FTK) in studies involving 405 young Kazakhs and 161 young Russians showed 23.9 percent of the Kazakhs and 28.6 percent of the Russians were not sensitive to FTK. The frequency of the "insensitive" gene (t) was 0.490 and 0.535 respectively and that of gene T, which determines the capacity to taste FTK, was 0.510 and 0.465 respectively. The percent of genotype tt among the Kazakhs was 0.239 and that among the Russians was 0.286, while these figures were 0.260 and 0.215 for genotype TT and 0.501 and 0.498 for genotype Tt respectively. Hypersensitivity to FTK is due to subjective factors. Sensitivity to various FTK dilutions of 15, 16 and 17 was found in 7.9 percent of the Kazakhs and 4.5 percent of the Russians. Figures 1;  
references 8: 6 Russian, 2 Western.

[1509-2791]

UDC 576.312.38

INTRASPECIES GENETIC POLYMORPHISM IN HUMANS AND SENSITIVITY OF CHROMOSOME APPARATUS TO MUTAGENIC ACTION OF VIRUS VACCINE STRAINS

Moscow IZVESTIYA AKADEMII NAUK SSSR, SERIYA BIOLOGICHESKAYA in Russian No 1, Jan-Feb 84 (manuscript received 19 Mar 81) pp 31-39

IL'INSKIKH, N. N., Tyumen' Medical Institute

[Abstract] Individual variations in sensitivity to mutagenic factors are known to be tied to genotypical features of the organism. The present article reports on study of cytogenetic disturbances induced by flu virus vaccine strains and measles vaccine. The chromosome composition of lymphocytes was analyzed prior to vaccination and 2, 7, and 30 days afterwards. The chromosome composition of 12 children with Down's syndrome and that of 10 healthy children prior to vaccination and 2, 7, 30 and 90 days after vaccination was also analyzed. Blood changes are outlined for the various experimental groups. An increase in the number of cells with cytogenetic disturbances was noted only 7 days after vaccination, and karyotype normalization was observed within a month. Down's syndrome children had more cytogenetic disturbances than normal children; vaccination caused no significant changes in the latter group. Disturbances also varied according to blood type of the test subjects. Other mechanisms causing changes in mutational sensitivity for children with Down's syndrome are also noted.

References 50: 28 Russian, 22 Western.

[1689-12131]

UDC 576.312.344

PORE COMPLEX AS DYNAMIC STRUCTURE AND PUTATIVE REGULATOR OF NUCLEOCYTO-PLASMIC RNA TRANSPORT

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian No 4, 1984  
(manuscript received 4 Jul 83) pp 100-106

ERENPREYSA, Ye. A., Latvian Scientific Research Institute of Experimental and Clinical Medicine, Latvian SSR Ministry of Health

[Abstract] Recent findings are reviewed in conjunction with pertinent data on the role of the pore complex in nucleocytoplasmic exchange. Particular emphasis is placed on the role of such complexes in attenuation of transcription and RNA transport. Currently, the evidence seems quite convincing for the hypothesis that the mobility of the pore complex and attendant translocation of bound products, i.e., RNA, is dependent on ATP-mediated contractility of the nuclear matrix. It is the complexity of the pore complex that lies at the heart of cell differentiation, determining as it does which transcripts enter the cytoplasm and are subsequently expressed in the cytoplasm. The problem is further complicated by the dynamic characteristics of the pore complex and its autonomy vis-a-vis the nuclear membrane, as indicated by its ability to separate from the latter and translocate into the nucleus itself or to the cytoplasm. Figures 2; references 54: 16 Russian, 38 Western.

[723-12172]

UDC 577.29:577.113.5

"SIMPLE" SEQUENCES OF RAT GENOME REVEALED BY HYBRIDIZATION WITH ADENOVIRAL DNA

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 276, No 4, Jun 84  
(manuscript received 17 Jan 84) pp 984-988

IVANOVA, M. N., TROLOVA, Ye. I. and GEORGIYEV, G. P., Institute of Molecular Biology, USSR Academy of Sciences, Moscow

[Abstract] Nucleotide sequence of clone fragments hybridizing with adenovirus DNA was reported for three clones (5, 8, and 16) elected after analysis of a library of  $7 \times 10^5$  clones. Analysis of the primary structure showed that the segments responsible for hybridization of all of these clones contained sequences of the "simple" type, consisting of randomly arranged 5'-AGC-3' and 5'-AGG-3'. The "simple" sequence was surrounded in all these clones by irregular DNA sequences. These "simple" sequences are characterized by considerable length. They are scattered through the genome, they are a part of hundreds of fragments surrounded by "complex" sequences. Their role is not yet clear. Possibly they participate in the initiation of recombination or in the integration of viral genome into chromosome. Figures 1; references 14: 2 Russian, 12 Western (2 by Russian authors).

[729-7813]

UDC 577.1

CHARACTERISTICS OF HUMAN SOMATOTROPIN SYNTHESIZED IN BACTERIA BY GENETIC ENGINEERING METHODS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 276, No 3, May 84  
(manuscript received 4 Apr 84) pp 762-764

RUBTSOV, P. M., PARSADANYAN, A. Sh., SVERDLOVA, P. S., CHUPEYEVA, V. V., LASHAS, L. V., SKRYABIN, K. G. and BAYEV, A. A., academician, Institute of Molecular Biology, USSR Academy of Sciences, Moscow; Kaunas Branch of the Institute of Experimental Endocrinology and Chemistry of Hormones, USSR Academy of Medical Sciences

[Abstract] *E. coli* strains producing human somatotropin were obtained by genetic engineering. Characteristic properties of a purified hormonal preparation obtained from the bacteria are described in this paper. Gel filtration of the synthetic material on Sephadex G-100 produced a single peak in the same region as the natural hormone. Biological activity of the "bacterial" preparation was evaluated by the "tibia test". The results showed that the product obtained by genetic engineering did not differ from the natural hormone synthesized in the hypophysis. Figures 3; references 13: 3 Russian, 10 Western.  
[728-7813]

UDC 581.163+575.42

INDUCTION OF HIGH FREQUENCY OCCURRENCE OF MATROCLINOUS HAPLOIDS IN CORN

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 276, No 3, May 84  
(manuscript received 9 Nov 83) pp 735-738

TYRNOV, V. S. and ZAVALISHINA, A. N., Saratov State University imeni N. G. Chernyshevskiy

[Abstract] The potential of using haploidy in selection of plants has been proven by theoretical and experimental studies. Practical application, however, were hampered by the absence of simple methods permitting production of haploids in quantities satisfying the field selection workers. Normally, to obtain matroclinous haploids in corn, genetic markers Brown (BM) and Fetal (FM) are used. The first has the genes a B P1 R, the second--genes ACR-nj:cudu. More effective marker analogues were isolated in this study: BMS and FMS (Brown and Fetal Saratov Markers), exceeding the standard markers 20-40 fold. BMS and FMS induced haploidy also in intralinear reproduction. It was shown that male gametophyte plays an important role in induction of haploidy. Overall, field studies have proven the effectiveness of new markers in a variety of materials tested. References 5: 4 Russian, 1 Western.  
[728-7813]

## HUMAN FACTORS

### MICROPROCESSOR EVALUATES PSYCHOPHYSIOLOGICAL CONDITION

Moscow MOSKOVSKAYA PRAVDA in Russian 7 Jul 84 p 3

[Excerpt] At the "Computer Technology" pavilion of the USSR Exhibition of National Economic Achievements, visitors will be able to see an unusual instrument.

More correctly, this is an entire electronic complex. It easily fits into a small, flat briefcase. Its capabilities are simply phenomenal. In a matter of minutes, the electronic complex will determine your condition and fitness for work, or help you choose a job specialty and predict your work efficiency.

There are occupations which, in addition to excellent health, require good reactions, special concentration and the ability of quick orientation in unforeseen situations. These occupations include first of all the work of divers, pilots and drivers. In this case, it is impossible to detect the necessary qualities by conventional methods. This is where the "Elektronika-NTs 110 Tonus" comes to the rescue. This is a kind of laboratory equipped with microprocessor technology. The physician attaches electrodes to the subject's forehead and hand. As it receives the data, the instrument quickly processes the data and determines the subject's psychological condition--whether he is even-tempered or high-strung, excited or depressed.

Specially developed tests are also used. Comparing their results with the norm, the "Tonus" gives a final answer.

FTD/SNAP  
CSO: 1840/773

UDC: 613.632.4:615.285.7:632.95

EFFECT OF BACULOVIRUSES ON HEALTH OF WORKERS INVOLVED IN PRODUCTION OF VIRAL INSECTICIDES

Kiev VRACHEBNOYE DELO in Russian No 5, May 84 (manuscript received 6 Sep 83)  
pp 116-119

[Article by V. L. Vasil'yeva, A. L. Gural', V. I. Trusov, D. P. Kachalay, T. P. Kondrattsova, L. P. Kaminskaya and D. Ya. Poberezkina, Laboratory of Medical Evaluation of Viral Insecticides (head: V. L. Vasil'yeva, doctor of medical sciences) at Kiev Scientific Research Institute of Epidemiology and Infectious Diseases imeni L. V. Gromashevskiy, and Clinical Laboratory of Biologically Active Substances (head: D. P. Kachalay, candidate of medical sciences), All-Union Scientific Research Institute of Hygiene and Toxicology of Pesticides, Polymers and Plastics, USSR Ministry of Health]

[Text] In view of the increasing adverse ecological effects of toxic chemicals, work is being pursued in many countries to find and introduce to practical control of harmful arthropods some safe biological agents. There are good prospects of using insecticides, the active element of which are microorganisms (viruses, bacteria, fungi) that elicit disease and death of insects. Investigation of the safety of this new class of live pesticides is under the control of the WHO and international organizations for environmental protection (WHO Report No 531, 1975).

Entomopathogenic viruses (particularly in the baculovirus group) appear to be the most attractive from the standpoint of safety, since they have the most marked selectivity of action (Ignoffo, 1975).

Extensive experimental data indicate that baculoviruses do not present an epidemiological hazard, do not elicit overt or latent infection in warm-blooded animals, do not adapt to the latter, and they are not toxic (Kheympel', Byuknen, 1967; Ignoffo, 1973; Kheympel', 1976; Tinsli, 1978; M. A. D'yachenko, 1981; Kherrap, 1982).

However, in spite of the virtually unequivocal answers concerning the safety of baculoviruses, the problem of their harmlessness cannot be considered solved. To date, there is no information about the effect of baculoviruses on man under industrial conditions. The relevance of such studies is quite great, particularly from the standpoint of preventive medicine, which must provide for organization of preventive and routine sanitary inspection in this new and promising sphere of the national economy.

We are submitting here the results of many years of clinical, immunological and microbiological studies aimed at determining the effect of baculoviruses on the health of workers involved in production of viral insecticides.

These studies were conducted at a biochemical plant, where there is a domestic experimental production installation in operation for production of the viral agents, Virin-ENSh and Virin-EKS. These agents have undergone state testing, they were found to be rather effective and economical. There are plans to build major industrial enterprises to produce them.

General clinical health tests were performed. The workers were examined by an internist, allergologist, dermatologist, ophthalmologist, otorhinolaryngologist, and they used the necessary laboratory, biochemical and instrumentation diagnostic methods. To determine nonspecific reactivity, we assayed lysozyme in blood serum and saliva (K. N. Veremeyenko, 1980), examined the autoflora of the nasopharynx, skin, intestine (N. N. Klemparskaya, G. A. Shal'nova, 1966), phagocytic activity of neutrophils (A. I. Ivanov, B. A. Chukhlanov, 1977), index of lymphocyte stimulation under the influence of PHA [phytohemagglutinins] in vitro using the blast-transformation reaction, absolute lymphocyte count of peripheral blood (Koulson et al., 1964), determined levels of immunoglobulins G, M and A in blood serum (Kh. Frimel', 1979) and immune complexes (Khashkova et al., 1977).

We used the passive hemagglutination reaction (PHAR) and specific leukocyte lysis (SLL) reaction to demonstrate the body's specific reactions to baculoviruses. These techniques were developed with reference to baculoviruses at the KNIEIB [Kiev Scientific Research Institute of Epidemiology and Infectious Diseases], and they are characterized by high specificity and sensitivity (A. L. Gural', V. L. Vasil'yeva, 1979, 1980). We measured the concentration of baculovirus polyhedrons in the air of work rooms, as well as in nasopharyngeal washings from workers with the agents using the method of immunofluorescent analysis--IF method (V. I. Trusov, V. L. Vasil'yeva, 1977).

We examined 39 people in all. The first (main) group consisted of 18 women 21 to 48 years old with work tenure referable to contact with viral agents of 1 to 10 years. The control group, similar in age, consisted of 21 people (OTK [department of technical control], vivarium, antibiotic shop and ceramic plant workers).

Current biotechnology of production of viral agents is rather simple and consists of several stages: cultivation of specific raw materials (feeding caterpillars of different Lepidoptera species), infection of caterpillars, collection of sick specimens, recovery of viral biomass from them, purification of virus, preparation of agent and its standardization. At all stages the technological process is open and requires manual labor.

Sanitary and hygienic inspection of production premises by the IF method revealed that high concentrations of baculoviral polyhedrons, from  $0.5 \cdot 10^3$  to  $0.5 \cdot 10^6 / m^3$  (after aerosol treatment of feed, preparing powder from dry caterpillars, in centrifuge department, etc.) were demonstrable at some of the biotechnological stages in the air of the work zone. Polyhedrons were also demonstrated in washings from the throat of individuals working at these

stages, with use of the IF method. The latter indicates that the virus could penetrate into the body through respiratory organs and the alimentary canal. Carrying baculoviruses was not associated with development of specific acute diseases of the respiratory tract. These findings are confirmed by our previous experimental studies of different animal species; it was reliably shown that baculoviruses are not infectious or toxic to warm-blooded animals, they do not adapt to them even after numerous passages under diverse extreme conditions (A. L. Gural', V. L. Vasil'yeva et al., 1979).

However, analysis of the results of the clinical examination of the groups under study revealed a higher incidence of certain complaints by subjects of the main group, as compared to the control. For example, already in the first year on the job, four people complained of itching of the skin of the arms, neck, face and eyelids. Objectively, signs of irritation of the integument and mucous membranes were found, which appeared while working with insects and disappeared after work. Investigation of this matter revealed that apparently the skin and mucosa are irritated by the caterpillar hairs, fuzz on butterflies, silk strands of silkworm eggs, etc., which pollute the air, get into respiratory organs and on the skin. Appropriate sanitary and hygienic rules were recommended. With increase in work tenure, the number of people complaining of deterioration of health increased. After 3 years, 7 individuals were diagnosed as having allergic dermatitis, there were cases of allergic rhinitis (3 people), allergic conjunctivitis (6), eczema (2) and bronchitis with an allergic component (3). Allergic diseases were diagnosed in only 3 out of 20 subjects in the control group: 2 were found to have pollinosis and 1, allergic dermatitis that developed against the background of fungal invasion of the feet.

The clinical findings served as grounds to conduct studies in order to evaluate immunological reactivity. The results of our experiments with animals showed that baculoviruses have sensitizing activity and could, by inducing immunological change in the body, lead to development of hypersensitivity of the delayed type (HDT) and production of antibodies (A. L. Gural', V. L. Vasil'yeva, 1979, 1980).

The experimental data were confirmed under natural conditions. Virtually all of the workers in the virological shop presented immunoallergic changes. Thus, in 1978, antibodies to the virus of gypsy moth nuclear polyhedrosis (VGMNP) were demonstrated in 71.4% of the workers and in 1979, in 54%, while 61.5% were sensitized to VGMNP protein; in 1980, 50% of the subjects had antibodies and 62.5% were sensitized; in 1982, antibodies were demonstrated in 50% and 60% were sensitized. Similar results were obtained with other baculovirus species.

According to data in the literature, our results are close to the highest indicators in sensitized workers in the chemical industry (L. I. Izraylet, 1979).

The results of immunological testing of workers for three baculoviruses that are the active element of agents produced at the plant (1981 data) revealed that 56.2% of the tested workers involved in viral production had antibodies to baculoviruses and a high degree of sensitization to viral protein, versus absolutely negative indicators in the control group.

The largest number of positive results with the PHAR and SLL tests was recorded with use of VGNMP antigen, which is quite understandable, since virin-ENSh is presently the basic product in the shop. More than 70% of the workers in the virus shop were found to have diseases such as rhinitis, pharyngitis, bronchitis, conjunctivitis, dermatitis, as well as chronic gastritis, colitis and liver diseases. A comparison of these data to the result of the immunological survey warrants the statement that, along with other factors, specific sensitization to baculoviruses plays a substantial role in the genesis of these pathological states.

Our microbiological studies revealed that, under present conditions of production of viral preparations, there are significant quantitative and qualitative changes in composition of autoflora in workers in this industry, as compared to the control group. A survey of aerobic microflora of the intestine and integument revealed significant increase in microbial forms with mannitol-decomposing and hemolytic properties of the *B. cereus* type (42%, versus isolated instances in the control). Moreover, there was more frequent cultivation of fungi of the genus *Candida* (32%), *Proteus* (15%) and *E. coli* with mild enzymatic activity. Changes were demonstrated in microflora of the eyes. Conditionally pathogenic and pathogenic microorganisms were found in the conjunctiva--*Staphylococcus aureus*, *pneumococcus*, Gram-negative enterobacteria and yeast-like fungi, which was associated with diseases of the conjunctiva and tear ducts.

There were disturbances in microbial biocenosis of the nasopharynx in 24% of the subjects. The isolated microorganisms included *streptococcus* of group A, *Staphylococcus albus* and *aureus*, *enterococcus*, yeast-like fungi and others. We also found a low percentage (14) of normal nasopharyngeal symbionts (*Streptococcus viridans*), which are distinctive markers of the general state of the pharyngeal biocenosis.

The demonstrated disturbances in the microbiocenosis can apparently be attributed to the specifics of modern biotechnological production and entomopathogenic preparations, when there are processes of decomposition of tissues from caterpillars that perished from the virus, at certain stages, with involvement of different species of pyogenic microorganisms; moreover, the agents themselves are often markedly contaminated with saprophytic and conditionally pathogenic microorganisms (V. L. Vasil'yeva, A. L. Gural', S. I. Bidnenko, 1979).

The reported changes in immunological status and microflora of the workers were observed against a background of decline of systemic reactivity: lysozyme level was low ( $8.43 \pm 0.96$   $\mu\text{g}/\text{mg}$  protein, versus  $16.1 \pm 0.43$  in the control), phagocytic index was 2.7, versus 3.9 in the control group, intracellular digestion constituted 56.2%, versus 79.4%. We also found a decrease in absolute lymphocyte count of peripheral blood and percentage of blast-transformed lymphocytes when they were stimulated with PHA in an in vitro culture ( $28.4 \pm 2.1$  in the observed group, versus  $43.3 \pm 1.8$  in the control).

Immunoglobulin G level was reliably higher than in the control ( $19.43 \pm 2.39$   $\text{g}/\ell$ ), immunoglobulin M content had a tendency toward increase ( $1.57 \pm 0.11$   $\text{g}/\ell$ ), while immunoglobulin A was reliably diminished ( $1.5 \pm 0.19$   $\text{g}/\ell$ ).

The changes in levels of serum immunoglobulins (G, M, A), when elevation of one (G) is associated with decline of another (A) is most probably the result of prolonged effect of baculoviruses on the immune system, leading to impairment of immunological reactivity. This is confirmed by increase in levels of immune complexes ( $101.6 \pm 16.07$  units), which is apparently due to increased production of antibodies in response to antigenic stimulation. As a result, secondary immunological insufficiency develops, which leads to depression of systemic reactivity.

Analysis of the data submitted here, with consideration of the vast factual material published previously concerning experimental studies of the effects of baculoviruses on man and animals, indicates that development of immunopathological reactions in the body is the most vulnerable area of manifestation of the possible harm of entomopathogenic viruses. Under industrial conditions of producing viral insecticides, when there is prolonged content with baculoviruses, these agents could sensitize the body and, against the background of diminished defense forces, this leads to development of allergic diseases in workers, which acquire the significance of an occupational deleterious factor.

All this indicates that, when producing viral insecticides, it is imperative to strive for closed biotechnology and mechanization of labor. It is necessary to work out standards and rules for sanitary monitoring of production, chiefly according to an immunological criterion, since no other criteria of the deleterious effect of baculoviruses on man have been found.

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10,657  
CSO: 1840/1075

LASER EFFECTS

UDC 616-006.04-085.849.19-036.8

USE OF SPECIALIZED LASER RADIATORS IN ONCOLOGY

Moscow SOVETSKAYA MEDITSINA in Russian No 3, Mar 84 pp 30-32

PLETNEV, S. D. and KARPENKO, O. M., Scientific Polyclinical Division, Moscow Scientific Research Oncological Institute imeni P. A. Gertsen

[Abstract] Work on developing practical procedures for laser surgery in treating cancer has been in progress at the Institute since 1965. Collaboration between engineers and the Institute staff has resulted in development of constant-beam CO<sub>2</sub> lasers to replace the original ruby lasers used in cancer surgery. These lasers have been used to treat basal and squamus cell carcinomas, skin melanomas and their metastases, etc. The asepticity of laser surgery and formation of a biological barrier have been found to contribute to rapid healing and significant reduction of recidivity. A major direction for continued development is in perfection of lasers with much shorter wave lengths that will permit minimal loss of power during operation. Simultaneous destruction of numerous tumor centers in one session, radical treatment without side effects and with economy, simplified methodology, subsequent treatment procedures and good cosmetic results are also areas for further improvement. Currently only 2% of laser operations prove unsuccessful, but even these can be followed by subsequent laser treatment of new malignancies. A drawback of laser surgery continues to be the damage caused to surrounding tissues.

[705-12131]

## HISTORY OF LASER SURGERY DEVELOPMENT

Moscow SOVETSKAYA MEDITSINA in Russian No 3, Mar 84  
(manuscript received 8 Dec 82) pp 61-65

KOREPANOV, V. I., doctor of medical sciences, Moscow

[Abstract] This is a survey of the literature dealing with advances in laser medicine. Since the first use of lasers for surgery in 1960, laser microsurgery has made great strides. The fact that a laser beam can destroy biological tissue in a given location without harming neighboring tissue immediately attracted the attention of cancer surgeons. The history of constant-beam CO<sub>2</sub> laser development is traced, including surgery of the liver, bladder, spleen and kidneys. Later, operations were developed for the mouth and throat, the abdomen, and the skin, as well as purulent injuries. Argon and Nd-YAG lasers are coming into use for gastrointestinal surgery. In the USSR, laser surgery has progressed significantly since the beginning of regular production of the "Skalpel-1" CO<sub>2</sub> laser in 1975 and the "Romashka" CO<sub>2</sub> laser with 80 watt power in 1981. Further development of laser surgery in the USSR has been given priority by the USSR State Committee for Science and Technology, which established the first laser surgery laboratory in the country in 1981 as a scientific center for such laser research. References 82: 24 Russian, 58 Western.

[705-12131]

## EFFECTS OF LOW-ENERGY HELIUM-NEON LASER TREATMENT OF CORONARY DISEASE ON HEMOSTASIS

Moscow SOVETSKAYA MEDITSINA in Russian No 2, Feb 84  
(manuscript received 2 Aug 83) pp 6-10

KOROCHKIN, I. M., ROMANOVA, G. R., KAPUSTINA, G. M., FANDEYEV, A. V., TUREBAYEV, M. N. and STEPANISHCHEVA, N. I., Chair of Elective Therapy Pediatric Faculty, 2nd Moscow Medical Institute imeni N. I. Pirogov

[Abstract] Clinical trials were conducted on the effectiveness of laser therapy in patients with coronary disease (53 males and females, 42-70 years of age), with particular attention to alteration in the hemostatic system. Treatment conditions consisted of irradiation with helium-neon laser (ULF-01, 630 nm, 0.4-0.6 mW/cm<sup>2</sup>, 30-60 sec/zone for a total of 20-25 sessions). During laser treatment, drug therapy was avoided in 60.4% of the cases, with the exception of nitroglycerin. Assessment of the efficacy of the laser therapy showed subjective and objective clinical improvements in 44 (83%) of the patients. In general, the incidence of angina pectoris decreased, systolic blood pressure fell by 15-20 mmHg and diastolic by

10-15 mmHg, the heart rate decreased by 12 beats/min, and in 25% of the patients the laser therapy had a sedative effect and improved sleep. After the course of laser therapy the rate and degree of thrombocyte aggregation diminished, as well as the aggregation of erythrocytes, with resultant improvement in the rheologic properties of the blood. These observations indicate that laser therapy constitutes a viable approach to the management of patients with coronary disease, and that the concomitant effects on the hemostatic system require further investigation. References 22:

16 Russian, 6 Western.

[711-12172]

UDC 617.7-007.682:615.849.19

#### STAGED LASER TRABECULOPLASTY IN OPEN ANGLE GLAUCOMA

Moscow VESTNIK OFTAL'MOLOGII in Russian No 3, May-Jun 84  
(manuscript received 20 Mar 83) pp 10-13

MAMEDOV, N. G., candidate of medical sciences, and SHTILERMAN, A. L., Scientific Research Problems Laboratory of Ophthalmic Microsurgery, Chair of Eye Diseases, Therapeutics Faculty, 2nd Moscow Medical Institute imeni N. I. Pirogov

[Abstract] Clinical trials were conducted with a modification of the Wise approach to laser trabeculoplasty [Wise, JB et al., Arch. Ophthalmol., 97:319-322, 1979], in the treatment of patients with various stages of open-angle glaucoma. Evaluation of the present treatment modality (argon laser, 800-1000 mW, focused to 50  $\mu$ m with 0.1-0.2 sec exposure) demonstrated that treatment of only one quadrant resulted in alleviation of ocular hypertension (21 mm or less) in 18.4-36.5% of the eyes, depending on the stage. In the cohort in which trabeculoplasty involved two quadrants the improvement rate was 34.3-52.5%, while a success rate of 40-75% was obtained in a four-quadrant approach. Although the highest success rate was obtained with the latter approach (which was utilized by Wise et al.), it is evident that in a large number of cases trabeculoplasty conducted in only one or two quadrants is sufficient for reduction of ocular hypertension to below 21 mm. An optimum therapeutic approach, therefore, consists of trabeculoplasty in only one quadrant initially and, in case of need, subsequent involvement of the other quadrants. References 5: 2 Russian, 3 Western.

[713-12172]

ASSESSMENT OF PLEOPTIC POTENTIAL OF RETINOMETER AND LASER REFRACTOMETER

Moscow VESTNIK OFTAL'MOLOGII in Russian No 3, May-Jun 84  
(manuscript received 10 Mar 83) pp 44-46

AVETISOV, V. E., candidate of medical sciences, and ANIKINA, Ye. B.,  
Moscow Scientific Research Institute of Eye Diseases imeni Helmholtz

[Abstract] Therapeutic trials were conducted with 30 patients, 4-15 years old, on the effectiveness of laser retinometer and refractometer in correcting amblyopia. The laser modality consisted of a helium-neon source (LG-52 or LG-52-3) with emission at 632.8 nm and an output power of 8 mW for the refractometer and 2 mW for the retinometer, yielding an exposure power flux density of  $10^{-6}$  J/cm<sup>2</sup> (i.e., two orders of magnitude lower than commonly used in laser therapy). Patients treated with the retinometric apparatus (13 subjects, 21 eyes) showed an improvement in visual acuity in 12 eyes (57%). The rate of improvement in the 17 patients (22 eyes) treated with laser refractometer was 54.5%. The relative degree of improvement by both methods of treatment was quite close (1.1 for retinometer and 1.4 for refractometer). These observations indicate that both instruments, used with lasers of appropriate intensity, possess pleoptic potentials and should be further investigated for the management of amblyopia. References 11:

7 Russian, 3 Western, 1 Czech.

[713-12172]

NANOSECOND ABSORPTION SPECTROSCOPY OF PHOTOCONVERSIONS OF BACTERIORHODOPSIN IN DRY FILMS, INFLUENCE OF EXTERNAL ELECTRIC FIELD

Moscow IZVESTIYA AKADEMII NAUK SSSR. SERIYA BIOLOGICHESKAYA in Russian No 2, Apr-May 84 (manuscript received 15 Oct 81) pp 294-298

CHAMOROVSKIY, S. K., PIKULENKO, A. Ya., VOZARI, E., BORISEVICH, G. P., KONONENKO, A. A., PASHCHENKO, V. Z., RUBIN, L. B. and RUBIN, A. B., Biological Faculty, Moscow State University imeni M. V. Lomonosov

[Abstract] Purple-membrane bacteriorhodopsin (Br) is the simplest of studied biological converters of light energy into electrochemical potential of hydrogen ions. The mechanism of this conversion is unclear, and the present article offers data on the kinetics of the rapid photocycles of Br in dry films and on the effect of electric fields on these processes. Purple membranes (PM) of *H. halobium* were prepared as thin films in a water suspension followed by air drying. Spectral measurements of photo-induced changes in Br absorption showed that light flashes brought changes involving only three intermediates at room temperature. The external electric field

affected photoconversion by reducing the amplitude of photo-induced Br conversions, and the electric field converted part of the Br into a photochemically inactive form. The electric field did not affect the kinetics of intermediate formation. Figures 3; references 19: 3 Russian, 14 Western. [690-12131]

UDC 616-006.04-033.2-092.9-02:615.849.19

NEW ORGANOTROPIC TRANSPLANTABLE MOUSE TUMORS: THEIR USE IN ASSESSMENT OF LASER EFFECTS ON METASTASIS

Moscow VESTNIK AKADEMII MEDITSINSKIH NAUK in Russian No 5, May 84  
(manuscript received 24 May 83) pp 85-91

SENIN, V. M., IVANOV, A. V., AFANS'YEVA, A. V. and BUNTSEVICH, A. M., All-Union Scientific Oncological Center, USSR Academy of Medical Sciences, Moscow

[Abstract] Novel strains of organotropic neoplasms were obtained by selective passage, in syngeneic animals, of mammary adenocarcinomas spontaneously metastasizing to the lungs in A/Sn mice. A subsequent subset of cells was derived with an increasing frequency of uterine metastases. After five passages the first tumor showed an incidence of pulmonary metastasis in 97-100% of the cases, while the second showed a frequency of uterine metastases on the order of 75% and also affected the kidneys, adrenals, and the ovaries. The latter tumor showed a similar distribution pattern in male mice (excluding the uterus). A teratocarcinoma derived from CAB/T6T6 mice, showing a preference for lymphatic rather than hematogenous spread, was similarly passaged and after 12 transplantations yielded a strain showing 90% metastasis to regional and distant lymph nodes. Studies on the modification of the rate of metastases in 2-3 month old A/Sn females with subcutaneously implanted tumors showed that innocuous-intensity laser irradiation of the inoculation site (helium-neon laser,  $2 \times 10^3$  W/m<sup>2</sup> power flux density, 3-5 J dose; 2-4 min/day for 2-4 weeks) reduced the incidence of target-specific metastases to a statistically significant extent (P equal to or less than 0.05). Figures 1; references 11: 4 Russian, 7 Western. [720-12172]

UDC 615.849.19.015.4:616.155.32

IN VITRO EFFECTS OF HELIUM-NEON LASER ON HUMAN LYMPHOCYTES

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK in Russian No 5, May 84  
(manuscript received 24 May 83) pp 40-43

TRAPEZNIKOV, N. N., KUPIN, V. I., IVANOV, A. V., MASHKOVTSOV, Yu. V.,  
VESKOVA, T. K., POLEVAYA, Ye. B. and KADAGIDZE, Z. G., All-Union  
Oncological Scientific Center, USSR Academy of Medical Sciences, Moscow

[Abstract] T and B lymphocytes isolated from the blood of donors and oncologic patients were subjected to irradiation with helium-neon laser (633 nm, 30 W/m<sup>2</sup>, 15 min) in vitro, to determine the functional effects of such treatment. Analysis of a number of immune parameters reflective of T (spontaneous rosette formation, total rosette formation) and B (complementary rosette formation, PHA blast transformation, Ia-like antigen expression, etc.) function showed that, in general, the indicators improved 1.1-fold in the case of the donor cells (1.4- to 1.6-fold maximum), and 1.2-fold in the patients' cells (1.8-fold maximum). In terms of subjects, T cells evidenced functional improvement in the case of 78% of the donors and 81% of the cancer patients, with corresponding figures of 75 and 78% for the B cells. Immunofluorescence studies on expression of B cell Ia-like antigens showed no effect, while suppressor activity of T cells improved in 65-70% of the samples. In addition, laser treatment resulted in an increase in the number of microvilli on the surface of the B cells, and elongation of the microvilli on the T lymphocytes. Figures 1; references 8; 5 Russian, 3 Western.

[720-12172]

UDC 616.211-002.2: 616.321-002.2]-08: 615.849.19

TREATMENT OF RHINITIS AND PHARYNGITIS PATIENTS WITH LOW-ENERGY LASER RADIATION

Kiev ZHURNAL USHNYKH, NOSOVYKH I GORLOVYKH BOLEZNEY in Russian No 3, May-Jun 84 (manuscript received 10 Jun 83) pp 17-20

TSYGANOV, A. I., TIMEN, G. E. and KHMELEVSKIY, V. Yu., Department of Inflammatory Diseases of the Ear, Nose and Throat, Kiev; Scientific Research Institute of Otolaryngology imeni A. I. Kolomiychenko

[Abstract] Development is reported of a method for using laser radiation in the treatment of patients with chronic rhinitis and pharyngitis. Equipment used was helium-neon lasers operating at a wavelength of 0.63 micrometers (red monochromatic light) at a power output of 20 milliwatts. Results are presented from the treatment of 125 patients using this method. Patients included 66 women and 59 men aged 14 to 72 with disease states lasting from 2 to 20 years. Details are given of the application of the laser radiation

in patients. Of 54 patients with chronic rhinitis, clinical improvement was observed after 5-6 sessions of laser treatment. The positive results achieved in 40 rhinitis patients were maintained through the follow-up at 6 months after treatment. The same pattern of improvement was seen in 53 of the 71 patients with chronic pharyngitis. Treatment was most effective in patients with catarrhal and subatrophic inflammatory diseases of the upper airways and the neurovegetative form of rhinitis. The effect was relatively low in patients with the allergic form of vasomotor rhinitis and chronic hypertrophic pharyngitis. The findings make it possible to recommend this form of treatment for some forms of chronic rhinitis and pharyngitis. References 21: 20 Russian, 1 Hungarian.

[1071-9642]

UDC 547.917 + 663.12

EFFECT OF CARBON AND NITROGEN SOURCES ON CRYPTOCOCCUS LAURENTII EXOPOLYSACCHARIDE SYNTHESIS

Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 19, No 6, Nov-Dec 83 (manuscript received 13 Oct 82) pp 728-732

VITOVSAYA, G. A., ANAN'YEVA, Ye. P., GRINBERT, T. A., BUKLOVA, V. N. and KOZLOV, A. I., Leningrad Chemico-Pharmaceutical Institute; Institute of Microbiology and Virology, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] Findings are presented from a study of the effect of various carbon and nitrogen sources in the synthesis and composition of exopolysaccharides in *Cryptococcus laurentii* strain 1803-K, which has previously been shown to produce a biologically active heteropolysaccharide containing D-mannose, D-glucuronic acid and D-galactose in ratios of 20:10:2 and, depending on culture conditions, amyloselike glucan. Glucose, saccharose, galactose, xylose, lactose, fructose and a mixture of sugars were used as carbon sources, and peptone, BVK [a protein-vitamin concentrate], yeast extract, ammonium sulfate, ammonium chloride, double-substituted ammonium phosphate, and sodium nitrite as the nitrogen sources. All cultures yielded exopolysaccharide containing the same polymers, namely mannose, xylose, glucuronic acid and galactose, but the yields of individual sugars varied with culture conditions. Inorganic nitrogen sources ( $\text{NH}_4\text{Cl}$ ,  $(\text{NH}_4)_2\text{HPO}_4$ ) increased xylose yield and affected galactose yield. Changes were observed in the polymer side-chains when ammonium salts were added to the culture medium. References 11: 10 Russian, 1 Western.

[1517-9642]

UDC 576.8: 628.356

STIMULATION OF METABOLISM IN MICROORGANISMS IN ACTIVATED SLUDGE IN PARTIAL BREAKDOWN

Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 19, No 6, Nov-Dec 83 (manuscript received 6 Jul 82) pp 804-809

SIMAKOV, Yu. G., All Union Correspondence Institute of the Food Industry, Moscow

[Abstract] A study was made of the effect of various activated sludge homogenates and broken down cells of Infusoria on bacterial metabolism in order to determine degradation rates for peptones and propyl alcohol and methyl alcohol by activated sludge. Zoogaea and microfaunal organisms were broken down into fragments measuring 10-20 micrometers and mixed with the sludge homogenates. The use of the sludge homogenates stimulated peptone utilization as a function of  $O_2$  saturation, which fell from 600 to 100 milligrams  $O_2$ /liter after 3 hours of aeration compared with a drop to only 150 mg  $O_2$ /liter in controls. Biochemical degradation of methyl alcohol occurred more rapidly than for the peptone: after 2 hours of aeration the methanol was virtually eliminated while in controls it was still present after 2.5 hours. Degradation of propyl alcohol was less rapid than for methyl alcohol but still more rapid than in controls: after 2.5 hours it had been removed from the experimental tanks from an initial concentration of 320 mg/liter. Comparison of the findings shows that regardless of the chemical composition of the artificial effluents studied, the rate of utilization of organic additives in the activated sludge increased in a medium containing broken down activated sludge or a homogenate of Paramecium. The mechanisms involved in the stimulatory effect are discussed. It is concluded that the method described can be utilized to intensify the purification of effluent without modifying existing aeration tanks. The method has already been used on an industrial basis and has increased purification rates by a factor of 1.5. Figures 5; references 16: 9 Russian, 7 Western. [1517-9642]

UDC 576.8

STABILITY OF DIAGNOSTIC PROPERTIES OF BACTERIA GENUS PSEUDOMONAS DURING PROLONGED STORAGE IN LYOPHILIZED STATE

Moscow IZVESTIYA AKADEMII NAUK SSSR. SERIYA BIOLOGICHESKAYA in Russian No 1, Jan-Feb 84 (manuscript received 23 Jul 80) pp 157-160

NADIROVA, I. M., DANILOVA, M. V., YEMTSEVA, T. V. and KUZNETSOVA, Ye. V., Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino

[Abstract] Considerable research has been done on specific pathogenic properties of microorganisms, such as *E. coli*, *lactobacilli* and *Pseudomonas*

caryophylli. The present article reports on study of the reliability of diagnostic properties of bacteria after prolonged storage in a lyophilic state. Duration of storage ranged from 12-18 to 120 months, at 4°C in darkness. Culture features were studied on meat-peptone agar or broth cultures. Biochemical, physiological and growth characteristics were studied. Results indicated no loss of original properties subsequent to lyophilization: the bacteria utilized glucose by oxidation and used the same oxygen sources as before lyophilization. An exception was *P. aeruginosa*, which after 120 months did not use inositol as before processing. Temperature limits remained the same, and all cultures grew in a pH range of 5.5 to 8.5 and withstood NaCl concentration in the medium of no more than 5%. Only in long-term (120 month) storage were any changes in characteristics recorded. References 22: 10 Russian, 12 Western.

[689-12131]

UDC 577.152.321;582.282.232

IMMOBILIZATION OF POLYGALACTURONASE FROM FABOSPORA MACEDONIENSIS YEAST ACM U-480

Moscow BIOLOGICHESKIYE NAUKI in Russian No 3, Mar 84  
(manuscript received 3 May 82) pp 90-92

YEGOROV, N. S., DATUNASHVILI, Ye. N., KOZLOV, L. V., LANDAU, N. S. and POKROVSKAYA, S. S.

[Abstract] Methods for obtaining immobilized enzymes have recently turned to re-use and improved stability technology. The present article reports on various methods for obtaining polygalacturonase formed by *Fabospora macedoniensis* ACM U-480. Reactivity was tested using an electrophoretic homogeneous preparation. The enzymes were treated with 2,4-dinitro-1-fluorobenzene (DNFB) in ethanol, then with glutaric dialdehyde. Results of the modification of the yeast polygalacturonase with the indicated agents support the hypothesis of the participation of amino-groups and aromatic amino acids residues in the enzyme's catalytic action. Covalent bonding of the enzyme and the carrier, diazotized spheron Ar A-1000, was achieved only by use of the protective action of the substrate. Peripheral hydrolysis of pectic acid with separation of short oligouronides was related to the type of exopolygalacturonase used. Spatial obstacles were responsible for variations in the nature of separation. Figures 1; references 7: 3 Russian, 4 Western.

[712-12131]

MIXED INFECTIONS OF HEp-2 CELLS WITH TRICHOPHYTON RUBRUM AND ONCORNAVIRUS:  
ULTRASTRUCTURAL CHANGES AND PROTECTIVE EFFECTS OF INTERFERON

Tbilisi SOOBSHCHENIYA AKADEMII NAUK GRUZONSKOY SSR in Russian Vol 113,  
No 1, Jan 84 (manuscript received 31 Mar 83) pp 169-172

KATSITADZE, A. G., SHETSIRULI, L. T. and BAKHUTASHVILI, V. I., Institute  
of Experimental Morphology imeni A. N. Natishvili, Georgian SSR Academy  
of Sciences

[Abstract] Ultrastructural changes were followed in HEp-2 cells cultured  
in medium 199 enriched with 10% bovine serum at 37°C following infection with  
Trichophyton rubrum and type D oncornavirus. Within 3 h of infection with  
T. rubrum the fungus was observed to adsorb on the plasma membrane and  
penetrate into the HEp-2 cells. During the first 24 h of mixed infection,  
replication of the oncornavirus was unhindered; thereafter replication of  
the fungus commenced, which interfered with viral multiplication and resulted  
in the formation of elongated anomalous oncornaviruses. Concomitantly,  
extensive ultrastructural changes were evident in the HEp-2 cells, indicative  
of cell destruction and leading to cell death in 48-72 h. Addition of inter-  
feron to the cell culture prevented the cytopathic effects of mixed infection  
and potentiated dissolution of T. rubrum within 48-72 h. Since addition of  
interferon to T. rubrum culture had no effect on fungal growth, and has been  
shown not to inactivate the virus, it appears to interfere with the repro-  
ductive mechanism of both pathogens. Figures 3; references 6: 4 Russian,  
2 Western.

[721-12172]

MOLECULAR BIOLOGY

UDC 547.963.32.05:577.113.6

SEMIAUTOMATIC SOLID-PHASE TRIESTER SYNTHESIS OF OLIGODEOXYRIBONUCLEOTIDES  
WITH PHOSPHATE ACTIVATION ON POLYMERIC CARRIER

Moscow BIOORGANICHESKAYA KHMIIYA in Russian Vol 9, No 11, Nov 83  
(manuscript received 27 Mar 83) pp 1511-1517

GORN, V. V. and ZARYTOVA, V. F., Novosibirsk Institute of Organic Chemistry,  
Siberian Department, USSR Academy of Sciences, and YARMOLINSKAYA, Ye. V.,  
Novosibirsk State University

[Abstract] Studies were conducted on solid-phase synthesis of oligonucleotides using 2-cyanoethyl activation of the phosphate moiety coupled to polystyrene carrier, commencing with p-chlorophenyl esters of 3' and 5'-nucleotides and utilizing triisopropylbenzenesulfochloride + N-methyl-imidazole for condensation. The approach was successful in the synthesis of nine oligodeoxyribonucleotides 6-14 bases in length in both the 3' to 5' and the 5' to 3' directions. Deblocking of the protective 2-cyanoethyl group was achieved with a triethylamine/acetonitrile mixture. The time required for one cycle of elongation was 2.5 h, with the simplicity and reproducibility of this approach rendering it suitable for adaptation to automated systems. Figures 1; references 15: 9 Russian, 6 Western.

[1519-12172]

REMOVAL OF O-PROTECTIVE TRITYL GROUPS IN OLIGODEOXYNUCLEOTIDE SYNTHESIS:  
EFFECTS OF STRUCTURAL FACTORS AND ACIDOLYSIS ON DETRITYLATION AND  
DEPURINATION

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 9, No 11, Nov 83  
(manuscript received 7 Jun 83) pp 1518-1530

BUTKUS, V. V., KAYUSHIN, A. L., BERLIN, Yu. A. and KOLOSOV, M. N.,  
Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of  
Sciences, Moscow, and SMIRNOV, I. V., Institute of Molecular Biology,  
USSR Academy of Sciences, Moscow

[Abstract] Studies were conducted on the structural factors important in determining the rate of detritylation and depurination of deoxynucleosides and nucleotides mediated by benzenesulfonic acid,  $ZnBr_2$ , trifluoroacetic acid, trichloroacetic acid, dichloroacetic acid, etc. Detritylation has acquired increasing importance due to the development of automated methods of oligodeoxynucleotide synthesis on polymeric supports. Evaluation of the reaction conditions showed that trifluoroacetic acid in dichloroethane was the most selective agent for assuring cleavage of 5'-dimethoxytrityl groups with the least depurination ( $k_{detrityl.}/k_{depur.} = 4.5 \times 10^5$ ) at room temperature. In conjunction with previous studies [Kayushin, AL, et al., Bioorgan. Khim., 9(4):511, 1983], it is evident that dichloroethane is the solvent of choice for solid-phase synthesis of oligonucleotides via the phosphotriester method. Figures 1; references 29: 8 Russian, 21 Western.  
[1519-12172]

## NONIONIZING ELECTROMAGNETIC RADIATION EFFECTS

UDC 616.345-002-085.847.8

### EFFECTIVENESS OF MAGNETOTHERAPY IN INFLAMMATORY ILLNESSES OF DISTAL SECTION OF LARGE INTESTINE

Kiev VRACHEBNOYE DELO in Russian No 5, May 84  
(manuscript received 7 Dec 83) pp 31-33

SEREBRIN, V. N., Gastroenterological Sanatorium imeni Gorky, Odessa

[Abstract] The medical applications of constant magnetic fields have recently received great attention. The present article reports on use of a constant magnetic field to treat patients with chronic proctosigmoiditis. The magnet was a carbon glass core with ferromagnetic material mounted inside. The core was charged with a magnetic field of 30-40 mT and inserted into the rectum for 20-30 minute sessions, for 15 sessions. Of the 60 patients given the treatment, most showed improvement manifested in disappearance of their former general weakness, rapid irritation and pain sensations. A case study is presented as an example. Results indicated that some 80-85% of the patients treated benefited from the constant magnetic field therapy.

[1074-12131]

UDC 616.833.24-085.847.8

### USE OF CONSTANT MAGNETIC FIELD FOR TREATING RADICULITIS

Kiev VRACHEBNOYE DELO in Russian No 5, May 84  
(manuscript received 14 Dec 83) pp 106-107

STASYUK, G. A., VOLOTOVSKAYA, Z. F., ROSOLOVSKIY, A. P. and TETYUK, I. N., Departmental Hospital, Ternopol Station

[Abstract] The present article reports on therapeutic effects on radiculitis of a constant magnetic field using leaf magnets with  $35\pm mT$  and standard bar magnets of ANKO-4 alloy with  $40\pm 5$  mT induction. An advantage of the leaf magnets is the possibility of figuring penetrating capacity in millimeters, while for bar magnets the unit is centimeters. The group of

78 patients was divided evenly into control and test groups; of the latter, 10 received leaf magnetic field therapy and 29 bar magnetic field treatment. Of the test group 36 showed some improvement after treatment; those suffering radiculitis had less pain, accompanied by some dizziness and a heavy feeling in the head, which is explained by the mild hypotensive effect of the constant magnetic field treatment. Of those given traditional treatment, 22 showed improvement, which began 5-7 days later than the improvements noticed in the test group.

[1074-12131]

PHARMACOLOGY AND TOXICOLOGY

UDC 615.918:582.28+613.2-099:615.918:582.28

CURRENT PROBLEMS OF MYCOTOXINS

Moscow VOPROSY PITANIYA in Russian No 1, Jan-Feb 84  
(manuscript received 11 Mar 83) pp 7-12

SHARMANOV, T. Sh., NIKOV, P. S., FADEYEEVA, L. M. and BUKHARBARYEVA, A. S.,  
Kazakh Branch, Institute of Nutrition, USSR Academy of Medical Sciences,  
Alma-Ata

[Abstract] Mycotoxins and, in particular, aflatoxins are important both in health care and for the economies of most countries of the world, but insufficient attention has been devoted to their study. The present article reports on research on contamination of grain in two major regions of Kazakhstan, the north and southwest, with aflatoxins from *Aspergillus flavus* (215 strains), *A. niger* (7 strains), *A. nidulans* (7 strains) and *Penicillium* sp. (106 strains). Analysis of data collected indicated that nearly all food product samples gathered contained numerous families and genera of the fungi being studied. During storage, the "field" varieties of fungi were gradually replaced by "warehouse" strains; *Monilia sitophila* and various aspergills thus replaced *Alternaria*, *Helminthosporium* and *Fusarium* strains. *Mucor* and *Rhizopus* contamination was relatively high in all sample grains except those from Alma-Ata and Tselinograd oblasts. The distribution of pencillin and aflatoxin G1, G2 and B1 is summarized. Secondary contamination in milk was also studied; it was largely represented by aflatoxin B1.

References 11: 8 Russian, 3 Western.

[715-12131]

UDC 616.36-091-02:615.918:582.282

MORPHOLOGICAL AND MORPHOMETRICAL STUDY OF LIVERS OF WHITE RATS WITH NUTRITIONAL DEFICIENCIES AND CHRONIC AFLATOXIN INTOXICATION

Moscow VOPROSY PITANIYA in Russian No 1, Jan-Feb 84  
(manuscript received 2 Aug 82) pp 57-60

KRYSTEV, L. P., VASILEV, T., BOROV, B. I. and KAMENOVA, B. B., Scientific Research Institute for Gastroenterology, Sofia, Bulgaria

[Abstract] Study of carcinogenic action of aflatoxins on the liver has shown that the toxin causes fibromyosarcoma of soft tissues rather than primary cancer of the liver. The present article reports on morphological changes in rats that had received aflatoxin B1 along with either full or reduced rations over periods ranging from 60 to 210 days. Results showed that rats given full ratios and the toxin exhibited polymorphism in liver cells by the 60th day, with bi- and multinuclear cells and mytozes. These morphological changes were even more obvious where rations were reduced, and were accompanied by peripheral chromatin distribution. By the 210th day, an analogous but less pronounced histological picture of the liver was observed. Morphometric study showed that the highest numbers of liver lobules and percentages of binuclear cells were found in the rats with a toxin dose along with full rations, while those with reduced rations had lesser changes. Figures 4; references 9: 2 Russian, 1 Bulgarian, 6 Western.

[715-12131]

UDC 616-008.931-099-022.38:[664.78:615.918:582.282

ENZYMATIC CHARACTERISTICS OF ALIMENTARY TOXICOSIS CAUSED BY GRAIN INFESTED WITH FUSARIUM SPOROTRICHIELLA

Moscow VOPROSY PITANIYA in Russian No 1, Jan-Feb 84  
(manuscript received 19 May 83) pp 61-64

KRAVCHENKO, L. V. and AVREN'YEVA, L. I., Institute of Nutrition, USSR Academy of Medical Sciences, Moscow

[Abstract] Studies have shown that trichothecin mycotoxins have selective effects on hemogenetic and immunocompetent body organs. The present article reports on the effects of such mycotoxins isolated from *F. sporotrichiella* in sub-cellular structures of the liver, spleen, thymus, bone marrow and blood serum of Wistar rats fed grain containing the toxins 6 times weekly for 4 weeks. Intoxication appeared as soon as the second day of the tests, in the form of adynamia, loss of appetite and diarrhea. Enzyme production and quality soon suffered as well, affecting hemogenesis and immunogenesis in various organs. Activity of certain lysosomal hydrolases of the liver declined, while enzymes of the spleen, bone marrow and blood serum increased,

apparently due to atrophy of those organs. The T-2 toxin present in the feed grain was regarded to be the chief cause of toxicosis. Figures 1; references 13: 4 Russian, 9 Western.

[715-12131]

UDC 613.263:664.782:615.918:582.282

POSSIBILITY OF CONTAMINATION OF RICE GRAIN BY MYCOTOXINS UNDER TEMPERATE CLIMATIC CONDITIONS

Moscow VOPROSY PITANIYA in Russian No 1, Jan-Feb 84  
(manuscript received 11 Mar 83) pp 64-68

L'VOVA, L. S., BYSTRYAKOVA, Z. K., MERKULOV, Ye. M., SHATILOVA, T. I. and KIZLENKO, O. I., All-Union Scientific Research Institute for Grain and Products of Grain Processing, Moscow

[Abstract] Aflatoxins have been found in various countries throughout the world. The present article reports on study of patterns of toxin formation in rice grains under natural conditions in Krasnodar Kray in 1978-1980, primarily with experimental storage of rice in warehouses with active ventilation that approximated production storage conditions. Results showed that where the prescribed storage conditions were maintained, infestations with *A. flavus* fungi were low and conditions for aflatoxin development were absent. Moisture, temperature and microbiological processes were related to accumulation of the most common aflatoxin B1. Moisture content above 16% and temperatures of 25-30°C brought initial toxin formation, which continued until temperatures of 50-60°C killed the fungi and reduced aflatoxin content. Rice developed aflatoxin much more slowly than corn (6-13 days compared to 3-5 days), and lower quantities of the toxin were found than in other types of grain. The rice husk prevented penetration of *A. flavus* into the grain itself, so that the fungi remained on the grain surface where they developed more slowly. Hydrothermal processing of rice grain made it possible to reduce aflatoxin content markedly, to levels below the maximum allowed content. Figures 3; references 12: 4 Russian, 8 Western.

[715-12131]

UDC 615.214.015.3.036.8

CLINICOPHARMACOKINETIC PROGNOSIS OF THERAPEUTIC EFFECTIVENESS: TEST DOSE STUDIES

Moscow ZHURNAL NEVROPATOLOGII I PSIKHIATRII IMENI S. S. KORSAKOVA in Russian Vol 84, No 3, Mar 84 (manuscript received 6 Dec 83) pp 401-406

BELAYEV, B. S., SIROTA, L. A., MINSKER, E. I., PANTELEYEVA, G. P., TSUTSUL'KOVSKAYA, M. Ya., USSR: KORZHINKOVA, V., LIBIGER, Ya., NOVOTNYY, V., Czechoslovakia; GASNER, P., Hungary, and VEL'BEL', M., Poland

[Abstract] Statistical and clinical studies were conducted on the prediction of clozapine (Responex) effectiveness, using the single test-dose method. Comparison of the results obtained in the multi-center international study showed that discriminant analysis of the pharmacokinetic data, in conjunction with clinical observations, made it possible to assign the patients to responder and nonresponder groups. A flow-scheme of the study is presented, on the basis of which an 84% accurate prognosis was made on the effectiveness of clozapine management of 136 patients. Figures 3; references 7: 3 Russian, 4 Western.

[704-12172]

UDC 615.214.31.03

NEUROMETABOLIC STIMULANTS (CEREBROPROTECTORS): SYSTEMATIC POSITION AMONG PSYCHOTROPIC AGENTS AND PRIMARY CLINICAL ACTIVITY

Moscow ZHURNAL NEVROPATOLOGII I PSIKHIATRII IMENI S. S. KORSAKOVA in Russian Vol 84, No 5, May 84 (manuscript received 18 Apr 83) pp 750-756

NISS, A. I., Department of Mental Disease Therapy, Moscow Scientific Research Institute of Psychiatry, RSFSR Ministry of Health

[Abstract] An analysis was conducted on the systematic position and scope of therapeutic effectiveness of neurometabolically-active agents, based on a study of 602 patients with various forms of mental illness. Such an evaluation led to the identification of 12 categories of activities exhibited by the agents of interest, on the basis of their effects: 1) Psychostimulants, 2) Antiasthenics, 3) Sedatives (tranquilizers), 4) Antidepressants, 5) Wakefulness/Consciousness-raising agents, 6) Antiepileptics, 7) Nootropics (neurometabolic stimulants), 8) Mnemotropic agents (affecting memory and learning), 9) Adaptogens (altering tolerance to exogenous factors), 10) Vasoautonomic agents, 11) Antiparkinsonism agents and 12) Antidyskinetic agents. Although an unambiguous distinction between the different forms of action is not always possible, the criteria delineated here can serve to classify such agents and identify specific (rare) and overlapping action spectra. References 31: 19 Russian, 12 Western.

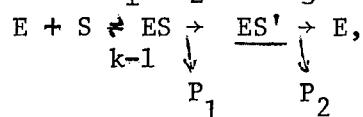
[703-12172]

## KINETICS OF CHOLINESTERASE HYDROLYSIS OF SUBSTRATE UNDER IRREVERSIBLE INHIBITION OF ENZYME

Moscow IZVESTIYA AKADEMII NAUK SSSR. SERIYA BIOLOGICHESKAYA in Russian  
No 1, Jan-Feb 84 (manuscript received 30 Jun 81) pp 55-61

ZHUKOVSKIY, Yu. G., Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad

[Abstract] Current perceptions of cholinesterase reaction with the substrate follow the pattern:  $k_1$   $k_2$   $k_3$



where E is the enzyme, S the substrate, ES the Michaelis enzyme-substrate complex ES' the acylated enzyme and  $P_1$  and  $P_2$  the products of substrate hydrolysis;  $k_n$  represents reaction constants. Other equations for cholinesterase reactions are proposed. Another reaction involves enzyme incubation with an inhibitor and phosphorylation of the enzyme, followed by substrate hydrolysis taking place simultaneously; the scheme for this is mathematically described. Cholinesterase preparation from horse blood serum, commercial acetylcholine iodide and commercial paraoxon or phosphakol were used in experimental checking of the calculations. Results showed that both calculation methods were corroborated by the experiments. Figures 2; references 10: 6 Russian, 4 Western.

ROSSIAN,  
T689-121311

STUDY OF TOXIN FORMATION OF *FUSARIUM SPOROTRICHIELLA*

MOSCOW IZVESTIYA AKADEMII NAUK SSSR. SERIYA BIOLOGICHESKAYA in Russian  
No 1, Jan-Feb 84 (manuscript received 16 Aug 82) pp 137-141

SOBOLEV, V. S., ELLER, K. I., VOLTYANSKAYA, E. V., DMITRIYEVA, I. V. and  
TUTEL'YAN, V. A., Institute of Nutrition, USSR Academy of Medical Sciences,  
Moscow

[Abstract] Microscopic Fusarium fungi are frequently toxic and infest feed, causing alimentary toxicosis of humans and animals. The present article reports on study of the chemical composition of toxic elements extracted from *Fusarium sporotrichiella* strains that were experimentally introduced into grain. Two variants of strain 5328a and strain 53 315 were cultivated in "Chapek" agar with 3% saccharose at 20-22°C, then incubated with grain before drying to constant weight in a vacuum. Toxicity was tested on Wistar rats weighing 100-140 g. Preliminary tests showed the three strains to have

almost identical toxicity, (which was found in the aqueous methanol fraction). The toxic component was almost completely extracted by chloroform, as borne out by parallel toxicological tests using the original grain, the aqueous methanol fraction and the chloroform fraction. Various other trichothecin toxins, along with the predominant T-2 toxin, were also isolated. Further study of the structure and properties of the chloroform fraction of the fungi is planned. References 14: 6 Russian, 8 Western.

[689-12131]

UDC 577.153.4.04+632.95.024

#### EFFECT OF PESTICIDES ON ACETYLCHOLINESTERASE OF ERYTHROCYTES AND THEIR PLASMATIC MEMBRANES

Moscow IZVESTIYA AKADEMII NAUK SSSR. SERIYA BIOLOGICHESKAYA in Russian No 2, Mar-Apr 84 (manuscript received 16 Feb 81) pp 210-216

PANASENKO, O. M., ZORINA, O. M. and GENDEL', Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] Pesticides are known to have carcinogenic, mutagenic, teratogenic, embryotropic and allergic effects on humans and domestic animals. The present article reports on the inactivating effect of anticholinesterase agents such as the organophosphorus insecticides paraoxon, phozalon and chlorophos. A second aim of the study was to determine the effect of chlorine-containing insecticides that do not directly attack acetylcholinesterase (ACE) but do cause changes in blood-producing organs of mammals. Erythrocytes and their plasmatic membranes, or shadow, from ox blood were studied for ACE activity by potentiometer, with an acetylcholine-chloride substrate. Kinetics of hydrolysis of the substrate were studied using an incubational method. All measurements were taken at 37°C. The data indicated the possibility of using erythrocyte shadows for quantitative evaluation of the effects of pesticides on membrane-bound ACE and molecular mechanisms of those effects. Paraoxon and chlorophos were found to be effective inhibitors of ACE, while ronnel and phthalophos had practically no such effect. The results confirm the suitability of the given membrane system for study of the molecular mechanisms of pesticide effects on erythrocyte ACE. Figures 2; references 17: 11 Russian, 6 Western.

[690-12131]

UDC 582.288.45:576.8.097.29

BIOSYNTHESIS OF T-2 TOXIN BY FUSARIUM SPOROTRICHIELLA ON VARIOUS PLANT SUBSTRATES

Leningrad MIKOLOGIYA I FITOPATOLOGIYA in Russian Vol 18, No 1, Jan-Feb 84  
(manuscript received 2 Nov 82) pp 73-75

RUKHLYADA, V. V., Ukrainian Scientific Research Institute of Experimental Veterinary Medicine

[Abstract] In order to determine the optimum medium and growth conditions for the production of the T-2 mycotoxin produced by *Fusarium sporotrichiella*, conditions are described under which the fungus was grown on various plant substrates at 20°C during the first week of culture, and at -2 to -7°C for two weeks thereafter. Extraction of the media with organic solvents and TLC were employed for the identification and analysis of T-2, as well as T-2-mediated inhibition of *Candida pseudotropicalis* growth. Rice grain favored formation of the highest concentrations of T-2 (1000 mg/kg), followed by rye (333.3 mg/kg), wheat grain and white corn kernels (200 mg/kg). Growth on barley, oat, millet, peas, soya beans, sunflower seeds, lucerne-hay and wheat-straw resulted in the production of T-2 in the range of 20.8 to 166.7 mg/kg. In addition, all substrates except wheat-straw and lucerne-hay also favored the formation of HT-2 toxin. These observations indicate that rice grain, as well as rye, wheat and yellow corn kernels can serve as preferred substrates for the production of high quantities of T-2 toxin under laboratory conditions. References 14: 10 Russian, 4 Western.

[718-12172]

UDC 547.964.4.05:577.175.325'17

SYNTHESIS OF PROTECTED OCTAPEPTIDE INTERMEDIATES IN PREPARATIONS OF ANALOGS OF HIGHLY ACTIVE 1-24 SEQUENCE OF ACTH

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 9, No 11, Nov 83  
(manuscript received 15 Feb 83, after revision 25 May 83) pp 1483-1491

SYSKOV, I. V. and ROMANOVSKIY, P. Ya., Pilot Plant, Institute of Organic Synthesis, Latvian SSR Academy of Sciences, Riga, and CHIPENS, G. I., Institute of Organic Synthesis, Latvian SSR Academy of Sciences, Riga

[Abstract] Classical methods of peptide chemistry were employed in the synthesis of protected octapeptides to serve as intermediates in the synthesis of ACTH analogs. The scheme selected consisted of condensation of peptide fragments in the 10+(6+8) approach to obtain sequence 1-24 of ACTH, with the individual octapeptides representing the C-terminal, condensed according to the (2+2)+(2+2) approach. Acid-labile Boc- or Nps-groups were employed for the protection of the  $\alpha$ -amino groups, with Z-groups for blocking the  $\epsilon$ -amino groups of lysine residues. The C-end carboxyl groups and the

$\gamma$ -carboxyl groups of glutamic acid were blocked by transformation into benzene- or p-nitrobenzene esters, while  $\alpha$ -carboxyl groups were protected by methyl or ethyl esters. The octapeptides synthesized were Boc-lys(Z)-[lys(Z)]<sub>6</sub>-lys(Z)-OBz1, Boc-lys(Z)-lys(Z)-[glu(OBz1)]<sub>5</sub>-glu(OBz1)-OBz1, Boc-lys(Z)-lys(Z)-(gly)<sub>5</sub>-gly-OBz1, Boc-lys(Z)-lys(Z)-(Phe)<sub>5</sub>-Phe-ONb, which were used for the preparation of ACTH analogs modified in positions 17-24. Figures 4; references 17: 3 Russian, 14 Western.  
[1519-12172]

UDC 547.964.4.05

NATURAL PEPTIDES AND THEIR ANALOGS. PART 31. SYNTHESIS AND PROPERTIES OF METHIONINE-5-ENKEPHALIN RETROANALOG

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 9, No 11, Nov 83  
(manuscript received 9 Mar 83, after revision 3 May 83) pp 1492-1496

SHVACHKIN, Yu. P., SHISHKINA, A. A., SMIRNOVA, A. P., FEDOTOV, V. P., INVANENKO, T. I., GUDOSHNIKOV, V. I., BUSHUYEVA, G. I. and BATRAMEYEVA, L. A., Institute of Experimental Endocrinology and Hormone Chemistry, USSR Academy of Medical Sciences, Moscow

[Abstract] A retroanalog of methionine-5-enkephalin was synthesized by standard peptide chemistry techniques to conduct comparative studies on in vivo and in vitro physiological effects of both preparations. In vivo studies on male Wistar rats showed that subcutaneous injections of 1 mg/kg of the retroanalog increased blood levels of prolactin from  $16.4 \pm 1.1$  to  $61.5 \pm 14.8$  ng/mg, i.e., the retroanalog was 2.2-times as effective as the native opiate. The in vivo effects of the retroanalog on prolactin secretion were blocked by nalorphine. In vitro studies with Wistar rat adeno-hypophyseal cell culture showed that both preparations failed to stimulate secretion. These observations indicate that the effects of met-5-enkephalin and its analog are not due to direct effects on adenohypophyseal cells, but are probably exerted via an indirect route through the hypothalamus or some other structure in the brain. References 10: 5 Russian, 5 Western.  
[1519-12172]

UDC 577.1

KININASE OF KARA-KURTA VENOM: PHYSICAL-CHEMICAL PROPERTIES AND KINETICS OF  
BRADYKININE CLEAVAGE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 276, No 5, Jun 84  
(manuscript received 10 Jan 84) pp 1265-1269

GOLUBENKO, Z., MAKEVNINA, L. G., AKHUNOV, A. A., PASKHINA, T. S. and  
SADYKOV, A. S., academician, Institute of Bioorganic Chemistry, UzSSR  
Academy of Sciences, Tashkent, Institute of Biological and Medical Chemistry,  
USSR Academy of Medical Sciences, Moscow

[Abstract] An earlier publication described an enzyme from *Latrodectus tredecim guttatus* spider venom which inactivated bradikinin (BK). In the present paper, study of the physical-chemical properties of that purified kininase preparation are reported: enzymic activity, molecular weight, aminoacid composition, N-terminal aminoacid, isoelectric focusing data, electrophoretic fractionation, kininase activity as a function of pH, its temperature stability, kinetics of catalytic cleavage of BK and initial reaction rates as a function of substrate concentration. The results indicated that this kininase is a peptidase with BK inactivating action more effective than other mammalian source kinases. Because of its non-toxicity and pH optimum in the range of physiological values, the purified enzyme should find practical application in studies of mammalian kallikrein-kininase-kininogen-kinine system. Figures 3; references 10: 4 Russian, 6 Western.

[730-7813]

UDC 001.89

COORDINATION OF SCIENTIFIC STUDIES IN AREA OF CHEMISTRY OF BIOLOGICALLY ACTIVE COMPOUNDS

Alma-Ata VESTNIK AKADEMII NAUK KAZAKHSSKOGO SSR in Russian No 10, Oct 83  
pp 21-23

SHARIFKANOV, A. Sh., corresponding member of KazSSR Academy of Sciences,  
YERZHANOV, K. B. and ISMAILOVA, Sh. Ye., Candidates of Chemical Sciences

[Abstract] The "Council on Chemistry of Biologically Active Substances" coordinates the work of three chemical institutes of the KazSSR Academy of Sciences and about 20 higher education institutions. Systematic studies are carried out on the synthesis and isolation of various biologically active compounds from the flora of Kazakhstan. Some of the achievements of this activity were represented by new drugs "Almakhin" (an analgesic), "Gliophen" and "Isophen" (anti-tumor agents) and "Cephedrin" (an antidepressant).

In the field of agricultural applications, the work concentrates on growth stimulators, feed protein sources, etc. Specific effort of several universities is reported. Plans have been developed for introduction of hundreds of new active compounds during the 11th Five-Year-Plan. It was proposed that a specialized pharmacological center be organized for the study of medical and toxicological aspects of these novel, biologically-active materials.

[724-7813]

PHYSIOLOGY

UDC 612.84

CHARACTERISTICS OF RECEPTOR FIELDS OF PRETECTAL REGION NEURONS

Yerevan DOKLADY AKADEMIYA NAUK ARMYANSKOY SSR in Russian Vol 27, No 2, 84,  
pp 83-86

GRIGORYAN, G. G., STOL'BERG, A. M. and EKIMYAN, L. A., Institute of  
Physiology imeni L. A. Orbeli, ArSSR Academy of Sciences

[Abstract] Acute experiments performed on 45 cats produced a detailed description of the structure of receptor fields of pretectal neurons. Study of responses of 166 neurons to light and dark stimuli revealed a group of neurons (19 percent) reacting only to movement of dark stimuli while 135 neurons responded to both dark and light stimuli. Areas of receptor fields of pretectal neurons are large and differ in structure from receptor fields of primary centers of the geniculostriatal optic system. A basic difference between the pretectal regions and other primary centers is the presence of dark-sensitive centers in the pretectal region. This confirms the existing assumption that formation of responses of dark-sensitive neurons at the level of the extrastriatal cortex is determined at the level of the mesencephalon, from which basic afferent information passes to the lateral suprasylvian region through the posterior nuclear complex of the thalamus. The differences of contours and areas of receptor fields, measured by dark and light stimuli, and differences in their overlap command attention. Figures 2; references 12: 1 Russian, 11 Western.

[664-2791]

DYNAMICS OF ACETYLCHOLINESTERASE ACTIVITY IN RAT HIPPOCAMPUS DURING DEVELOPMENT OF CONDITIONED DEFENSE REFLEX

Moscow IZVESTIYA AKADEMII NAUK SSSR. SERIYA BIOLOGICHESKAYA in Russian No 1, Jan-Feb 84 (manuscript received 17 Jul 81) pp 133-137

LOSEVA, Ye., V., DISH, T. N. and STEFANOV, S. B., Institute of Higher Nervous Activity and Neurophysiology, USSR Academy of Sciences, Moscow; Institute of Poliomyelitis and Viral Encephalitides, USSR Academy of Medical Sciences, Moscow

[Abstract] Changes in the activity of acetylcholinesterase (ACE) activity have been found through biochemical research to be related to processes of formation and fixation of temporary connections in the hippocampus. Further definition of this research through attribution of cholinergic mechanisms of the brain to specific microstructures in rat brains forms the topic of the present article. The research concentrated on the dorsal hippocampal fields of 60 male rats after they had been conditioned in a two-way escape cage to the point of 10 correct responses. The experimental rats and active and passive control groups were then decapitated and brain sections studied. Results showed that the conditioned group had reduced ACE activity, while the active control (which had been subjected only to random light and electric shock stimulation) had increased activity. Variations correlated to the rate of learning are discussed. With rapid reflex learning, ACE activity increased, while with slower learning it decreased, but both groups showed lower activity than the active control group. In 24 hours, ACE activity for all three groups regressed toward normal values in keeping with the manner of its earlier change; all decreased in comparison with the passive control group (which received no stimulation). All changes during rapid learning took place in fields CA1, CA2 and CA3, while in slow learning only field CA3 was involved. Figures 1; references 11: 8 Russian, 3 Western.

[689-12131]

PUBLIC HEALTH

UDC 614.2:008(47+57)

HIGH REQUIREMENTS AND GREAT TASKS

Moscow KLINICHESKAYA MEDITSINA in Russian No 5, May 84 pp 3-5

[Text] In the resolutions of the December (1983) and February (1984) Plenums of the CPSU Central Committee, the immediate tasks of the party and the nation were defined: further increase in the effectiveness of production, acceleration in the economic development of the country, improvement in the system for planning and direction, and achievement of new successes in communist development.

At the December (1983) Plenum of the CPSU Central Committee, it was especially noted that it will be necessary "to guarantee continued growth in the effectiveness of the economy, to make major thrusts in increasing the level of management, to accelerate scientific-technical progress, to more completely utilize the industrial potential, and all material, labor and financial resources."<sup>1</sup> In the resolutions of the Plenum, it was stated: "It is necessary to extend efforts in the areas of directing model procedures and organization of production for all segments of economic and cultural development, and to actively fight for strengthening governmental, planning and working disciplines."<sup>2</sup>

At an appearance during the February (1984) Plenum of the CPSU Central Committee, Secretary General of the CPSU Central Committee Comrade K.U. Chernenko noted: "Deep satisfaction stems from the wide response of the working collectives of the country to the appeal of the December Plenum--to obtain a more than planned for increase in the productiveness of labor of 1 percent and an additional decrease in the net cost of production of 0.5 percent. The patriotic rise in energy and efficiency, with which labor, party, trade union, and Komsomol organizations undertook the solution of this task, provided the assurance that success will be guaranteed.

I think that one should examine the question related to the fact that all means and resources which will be obtained because of this, and they are not insignificant, should be focused on improvement in the conditions of labor and living conditions of the soviet people, in medical care, and in construction of housing. This would be completely in accord with the highest goal of the politics of the party--all possible concern for the welfare of man."<sup>3</sup>

Much attention in the speech of Secretary General of the CPSU Central

Committee Comrade K.U. Chernenko at the February (1984) Plenum of the CPSU Central Committee was directed at the promising questions of economic development of the economy of our country, the improvement in the manner of leadership, and ideological questions. "To construct a new world," said he, "this means relentless responsibility for molding the man of the new world, of his ideological-moral growth. Namely, as is known, questions of ideological, mass-political work were considered from this point of view at the June Plenum of the Central Committee. In accordance with its apparatus, the party will achieve these goals so that this work completely responds to the character of important and complicated tasks of improvement of developing socialism."<sup>4</sup> A significant part in the appearance of Comrade K.U. Chernenko was spent on questions of external politics of the Soviet government, the struggle for a stable world on Earth, and decreasing international tensions.

Workers of our country have responded enthusiastically to the resolutions of the December (1983) and February (1984) Plenums of the CPSU Central Committee, summoning communists, and the entire soviet people to new successes in the work of communist construction.

One should note with satisfaction, that in fulfilling the resolution of the 26th CPSU Congress, and subsequent Plenums of the CPSU Central Committee, the soviet people, even in the elapsed time of 1983, have achieved great successes in economic and social development of our country.

In a report of the USSR Central Statistical Administration (PRAVDA, 29 January 1984) it was noted: "In 1983, the furthest rise in the USSR economy was reached, the qualitative indices were improved, and the tempo of economic growth was accelerated. Increase in the prosperity of the soviet people continued... The national income increased to 14.5 million rubles and constituted more than 530 million rubles (in real costs)." It was further underscored, that "four-fifths of the national income was channelled directly to the national welfare." The data presented attest to further improvement in medical care and the organization of recreation for the population. Thus, in the report of the Central Statistical Administration, it was stated that the number of physicians in all specialties in our country increased during the year to 32 thousand and care reached 1 million 100 thousand people. The number of places in sanitoriums, boarding houses, and rest homes at tourist points increased to 46 thousand. More than 60 million workers have been treated and have vacationed at these establishments, and 35 million of them have stayed at tourist routes and points. Approximately 28 million children and adolescents spent summers in pioneer camps, at excursion-tourist points, and travelled in this period to suburban locations with establishments for children.

These numbers attest to the large amount of attention which has been directed at maintaining and strengthening the health of the population of our country by the Communist party and by the Soviet government.

The successes attained represent still another essential step in fulfillment of the complex program for the development of public health in our country, targeted in the resolutions of the CPSU Central Committee and the USSR Council

of Ministers "On measures for further improvement in the national health" (1977) and "On additional measures for improvement in maintaining the health of the population" (1982).

Many working collectives at medical scientific-research institutes, higher institutes of learning, and therapeutic-prophylactic establishments have achieved successes in the past year.

Recently, MEDITSINSKAYA GAZETA reported that for achievement in 1983 of the highest results at the All-Union Socialist Competition and for successful fulfillment of assigned goals of the complex scientific-technical programs and programs for the solution of major scientific-technical problems, the collective at the All-Union Cardiology Scientific Center of the USSR Academy of Medical Science was awarded the Challenge Red Banner of the CPSU Central Committee, the USSR Council of Ministers, the All-Union Central Council of Professional Unions and the Central Committee of the All-Union Lenin Communist Union of Youth and their achievement was recorded at the All-Union Board of Honor in the USSR Exhibition of the Achievements of the USSR National Economy.<sup>5</sup>

For achievement of the highest results in the All-Union Socialist Competition and successful completion of the Government Plan for Economic and Social Development of the USSR during 1983, the collective at the Bashkir Republic Clinical Hospital imeni G.G. Kuvatov (Ufa), the Valmiyera Central Rayon Hospital (Latvian SSR) and the Voroshilovgrad Polyclinic No. 10 were awarded the Challenge Red Banner of the CPSU Central Committee, the USSR Council of Ministers, the All-Union Central Council of Professional Unions and the Central Committee of the All-Union Lenin Communist Union of Youth.

At the present time, the tasks before us are to constantly improve the forms and methods for organizational and political-educational work, in every possible way to generate working activity and initiative which will increase the discipline of all those who participate in production and the individual responsibility of cadres for commissioned work, to achieve new successes in organization of medical care for the population, prophylaxis for diseases, to increase the effectiveness of research and to improve the methods for introducing their results into the practice of public health. One ought to concentrate attention on decisive elimination of all remaining deficiencies in the work of a number of therapeutic-prophylactic and scientific medical establishments. A major task for public health is further development of the prophylactic direction of soviet medicine, the introduction of a yearly dispensarization for the entire population of our country, the basic goal of which would be prevention of disease, decrease in morbidity, and a wide-scale implementation of sanitation measures, directed at strengthening the health of the population.

On April 10, 1984, the next Plenum of the CPSU Central Committee took place, a meeting which was concerned with resolutions "On the further improvement of work of the Council of National Representatives" and "On the basic directions for reforms of non-specialized and occupational schools." As a result, during the first session of the 11th Meeting of USSR Supreme Soviet the Presidium of

the USSR Supreme Soviet was elected and Secretary General of the CPSU Central Committee Comrade Constantin Ustinovich Chernenko was unanimously selected as its chairman. The Council of USSR Ministers was formed. Appraising the significance of the April (1984) Plenum of the CPSU Central Committee and the session of the USSR Supreme Soviet, and the resolutions adopted during it, the newspaper PRAVDA emphasized that they "...supplied the party and the entire soviet people with concrete arrangements for the realization of current and future tasks in the current state of development of our society. Now it is necessary to bring them to each soviet citizen. The press, radio and television play a great role in this. Their basic task is to emphasize initiative of the masses, to publicize progressive experiments, to develop on a wide scale socialist competition, and to aid in the establishment and utilization of reserves, in overcoming inadequacies and difficulties" (PRAVDA, 16 April 1984).

The December (1983), February and April (1984) Plenums of the CPSU Central Committee pointed out to us, the medical workers, the need for positive and accurate fulfillment of the resolutions of the party and government on questions of public health, for increasing the level of organizational activity, and further improvement in medical care for the population of our country.

#### FOOTNOTES

1. "Materialy Plenuma Tsentral'nogo Komiteta KPSS" [Materials on the Plenum of the CPSU Central Committee], Moscow, Politizdat, 1984, p 27.
2. Ibid., pp 29-30.
3. "Materialy vneocherednogo Plenuma Tsentral'nogo Komiteta KPSS" [Materials on the Special Plenum of the CPSU Central Committee], Moscow, Politizdat, 1984, pp 12-13.
4. Ibid., pp 16-17.
5. MEDITSINSKAYA GAZETA, 22 February 1984.

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CSO: 1840/1067

## PREVENTATIVE HEALTH CARE

Tselinograd FREUNDSCHAFT in German 16 Jun 84 p 3

[Article by Galya Akhmedova, deputy minister of health of the Kazakh SSR: "For Active Health Maintenance"]

[Text] The trend toward prevention is an important principle of Soviet health care. It has the goal to eliminate the causes of diseases and the conditions favoring their development, to care for the health of people and to insure their active working ability and long life.

During the period of extensive development of communism, prophylaxis as the basis of the health care system has been gaining importance because the development of the national economy with its high level of productive forces, well being and culture of the population, and with the advancement in the sciences, has produced an enormous material base for the cardinal solution of the problems of active health protection.

The main directions in social policies which had been outlined in the resolutions of the 26th Party Conference of the CPSU and in the resolution of the Central Committee of the CPSU and of the USSR Council of Ministers "On the Health Protection of the People" foresee the achievement of broader measures for keeping the nation healthy. Guaranteed will be the benefit of free, quality medical care for all members of society through the adequate supply of medical cadres.

But the qualitative level of medical care does not at all, as yet, always satisfy the requirements of advanced socialism. This has been repeatedly stressed in the party resolutions of the past few years. Great efforts are needed to fulfill them. Special attention should be given to the prevention of diseases and, as a means for it, to the introduction of an annual checkup in preventive dispensarization for the entire population. The need of devoting special attention to this problem was stressed at the June (1983) general session and at the subsequent general sessions of the Central Committee of the CPSU.

At the June (1983) general session of the Central Committee of the CPSU, our health service was assigned the task of carrying out yearly dispensarization for the entire population. This represents a new stage in the development of Soviet health care.

It involves yearly medical examination of the entire population including laboratory tests in order to find the risk factors for the development of diseases and the diseases themselves in their early stages (above all cardiovascular diseases, tumors, endocrine and lung diseases); it also includes the subsequent medical observation of the patients and their restoration to health. Particular attention should be paid to the dynamic observation of the state of health and development of children.

In the dispensarization service involving the entire population, the examination of individual population groups will continue; these include the workers of the leading industrial branches, of construction and agriculture, those who work under potentially harmful conditions as well as workers in the food industry, in communal establishments, in child care facilities, pupils and students, invalids, participants of the Great Patriotic War, etc.

The annual dispensarization checkup for the entire population will be provided through the network of ambulant services and polyclinics where mostly medical workers from hospitals and specialists from medical schools and from other institutions will be relied upon.

According to the program, this annual, thorough dispensarization checkup for the population should be done in two stages.

In the first stage (1984-87), the resources of the health service will be used at peak efficiency, the population will be checked at every place, medical examinations in the cities and the country will be carried out to their full extent. However, during the first years of the dispensarization examination, there will be a lack of certain specialists at some places but measures should be taken to supply the provincial districts with specialists, to materially support medical installations and to prepare the local personnel for providing dispensarization to the entire population.

In the second stage (1988-90), the extent of the dispensarization will be widened. The urban and rural population will be examined by physicians of all specialties whereby the tests in special laboratories using the most modern technical equipment should be considerably increased and the quality of dispensary care should considerably improve.

In the Kazakh SSR Ministry of Health and in the health establishments of the oblasts and rayons, special commissions have been formed which should introduce this work according to the plans. Already, concrete plans have been worked out for the annual dispensarization of the population. It should be done according to four zones of the territory of the republic.

The heads of the ambulatoriums and polyclinics are in charge of fulfilling the individual treatment plans of the patients which had been worked out by the uchastok physicians and specialists, and they provide a general plan of the therapeutic and financial measures to be taken by their institutions whereby the enterprise sanatoriums must also play a greater role.

Every person found, during the annual dispensarization, to carry the so-called risk factors must be followed and treated by the uchastok internist or pediatrician and the appropriate specialists according to the individual plan.

At the present time, about a third of the population does not get a medical examination in the course of a year. Through the introduction of the annual dispensarization of the population, the total number of visits to physicians will increase by about 30 percent. The extent of laboratory testing will increase by nearly 40 percent. The need for medication will also be greater, of course. These together presume thorough organizational work on the part of our installations.

We should like to hope that the medical workers and company organizations, and also other public organizations will guarantee the effective performance of annual dispensarization of the population of our republic and will further raise the level of health maintenance of the Soviet people.

2473

CSO: 1851/02

## IMPROVEMENT OF PHYSICIAN-PATIENT RELATIONS

Moscow SOVETSKAYA ROSSIYA in Russian 30 Jun 84 p 1

[Article: "A Physician's Responsibility"]

[Text] We often hear and talk about the concern about people's health. But do we always realize how much stands behind those words? This year, for example, about nine billion rubles have been appropriated for those purposes, the construction of dozens of new hospitals and polyclinics is planned, and more than 25 thousand physicians are to be trained. The successes that modern medicine has achieved would have been impossible without incorporating into public health practice the contemporary methods and means of diagnosis and the methods of preventing and treating diseases. Recently included into the number of the most important public health tasks is an annual prophylactic medical examination to be given to the entire population that will make it possible to raise even higher the quality of medical services in the country.

But there is one more component in the successful maintenance of human health and life which perhaps is the most important, since it can increase by many times the yield of all that is invested in public health, or conversely, reduce that investment to a minimum. That component is the attitude of the physician or any medical worker toward his own obligations.

As a matter of fact, is there not one more such sphere, besides, perhaps, national education, where the final results of work directly reflect not only mastery of one's subject and experience, but also purely human qualities such as responsiveness, kindness, a sense of obligation, and the ability to co-experience suffering? "Give my many heartfelt thanks to the physicians Kravtso and Khodenev," writes Ye. N. Shilova from Severo-Zadonsk in Tul'skaya Oblast, in her letter to the editor. "They were very attentive to my husband when I brought him to the hospital and quickly determined what his actual illness was. And they treated me as if I were their own mother. I wish we had more of such responsive and kind people."

Many readers of our newspaper have written to us about the kindness, sensitivity, and self-confidence of physicians. The relatives of A. A. Belovaya who suffered two infarcts in her 70th year, wrote in detail

about the all-around care given to her, and mention with gratitude the names of not only physicians, but of nurses and attendants of the intensive care ward at Moscow Hospital No. 54.

We have many good physicians. Included among them in the republic are 60 Heroes of Socialist Labor, 33 persons who bear the honorable title "People's Physician of the USSR", over five thousand persons with the title "Meritorious Physician of the RSFSR", and more than 55,000 persons who have been awarded the badge "Outstanding Public Health Worker." As a rule, these are people who not only have a masterful command of the essential knowledge and skills required in their profession, but also exhibit a maximum sense of responsibility for the cause they serve, and are always kind and tactful with patients and colleagues. It is only that kind of combination that allows one to speak of a physician's genuine professionalism.

At the same time there are still quite a few examples of callousness, hard-heartedness, and even criminal negligence committed by personnel at medical institutions which have led to grave consequences and have cast a dark shadow over representatives of this humane and noble profession. Public health organs note with alarm that the careless attitude of some physicians toward their obligations has been significantly reducing the effectiveness of many measures designed to improve the level of public medical services. The number of complaints about activities that are incompatible with medical ethics has not been decreasing in recent years.

This is also noticeable from readers' letters. Letters about compassionate kindness, selflessness, and self-confidence on the part of medical personnel have been arriving alongside letters with complaints about callousness, non-professionalism, and rudeness which readers have encountered at institutions that always have been characterized by mercy and a high sense of duty. Frequently, gratitude and complaints are combined in a single letter. We have cited the words of gratitude expressed by the reader Ye. N. Shilova from Severo-Zadonsk. But before that she wrote about the long ordeal she had to endure in attempting to get a thorough examination of her invalid, ailing husband and a precise diagnosis and proper course of treatment for him. Furthermore, she had to put up with indifference and sluggishness on the part of personnel in her own polyclinic as well as in the hospital to which her husband was sent for treatment and at the first-aid (skoraya pomoshch) station whose personnel came for her husband. And it was only after the patient who could no longer stand, was sent on a "passenger machine" to another clinic, that our reader finally found that which was her right from the very start--participation and assistance.

Unfortunately, not all such cases always end up favorably. Readers still frequently write about criminal negligence or incompetence of other physicians. The editors have been sending these letters to the republic and union ministries of health where such cases are thoroughly examined and analyzed, and acted upon with specific measures. In particular, the USSR Ministry of Health has informed the editors that as a result of checking into the letter written by V. M. Milyukova from Kaluzhskaya Oblast, severe disciplinary

reprimands have been issued to the supervisors of the medical institutions where her husband was treated, and the case against physicians who have crudely violated regulations about according medical assistance has been transmitted to the investigative authorities.

Similar measures are being taken in other analogous cases. Last year alone, more than 400 physicians in the RSFSR were deprived of their licenses for serious negligence and 72 physicians were found guilty of actions inappropriate to their duty position, and many employees of medical institutions have been subjected to disciplinary action.

However, the medical workers themselves say: "A disease is easier to prevent than to cure." And punishment, if one applies medical terms further, is the equivalent of surgical intervention which is adopted when other methods turn out to be ineffective or are not implemented in time.

Where and what did we fail to do? An analysis of misdemeanors committed by physicians indicates that they most often occur in those collectives where supervisors, Party, and public organizations are not giving sufficient attention to training activities and are more concerned about the "honor of the uniform" than the elimination of shortcomings and the creation of circumstances those principal purpose is an improvement in patients' health and mood.

The procedures for the professional certification of personnel in which equal weight should be given to the physician's mastery of his subject matter as well as his moral-ethical qualities, are not being fully utilized in some medical institutions. All of this is frequently the result of poor controls on the part of the public health organs.

There is one more situation to which we ought to turn our attention. We at times forget that a physician's job requires a special stock of character, high moral caliber, and, if you wish, talent. And if that is so, then the usual yardstick by which matriculants are judged for admission into VUZ's are not suitable here. Persons who aspire to the high title of physician should be selected for admission to the VUZ with special thoroughness, and perhaps thought should be given to special interviews and tests. In this regard, it would not seem to be a bad idea if priority were given to those applicants to a medical institute who have worked in polyclinics and hospitals after their graduation from secondary school. Very frequently a "sifting out" of applicants occurs already at this stage and application documents are submitted to the VUZ only by those who have become convinced of their chosen field while working at the hospital or polyclinic. They must learn well the "A,B,C's" of dealing with patients and they must receive their studies and acquire specific skills at the VUZ in a timely fashion and learn how to make use of them under any circumstances or frame of mind. This is not as simple as it would seem at first glance. Medical ethics, the teaching of legal, professional, and moral obligations and regulations for medical personnel-patient relations, is becoming increasingly important among the medical sciences. An All-Union conference was held in Moscow quite recently where conference participants discussed topical questions

of medical ethics in surgery and formulated specific recommendations with respect to medical ethics.

Experience has shown that such recommendations, like all achievements of science and training "work well" primarily where the efforts of experienced supervisors have created a business-like, well-intentioned, and at the same time, exacting atmosphere. A good reputation in the district has been earned, for example, by workers at the Matveyevo-Kurgan Central Regional Hospital of Rostovskaya Oblast through their sensitivity, efficiency, and concisely organized work. Considerable credit in this effort is due to the experienced educator and administrator, the hospital's chief physician, I. A. Atamanov. No complaints from patients or relatives are heard about the personnel at the Kushchev Central Rayon Hospital of Krasnodarskiy Kray which has for many years been headed by Meritorious Physician of the RSFSR A. I. Shapovalova, or are there complaints about other leading medical collectives.

However, as was already noted, there are quite a few examples of another kind. Such examples are intolerable, particularly now that the Party, in manifesting its concern about the health of the Soviet people, has adopted the decision to institute prophylactic medical examinations (dispensarization) for the entire population. To raise the level of the physician's responsibility and intensify control over the public health organs under those conditions are tasks of the utmost importance that must command the focused attention of rayon, city and oblast Party committees.

6289

CSO: 1840/743

## DIFFICULTIES IN DENTAL CARE

### Visit to Stomatologist

Moscow SOVETSKAYA ROSSIYA in Russian 18 Mar 84 p 2

[Article by P. Konstantinov, M. Mikhalkov and V. Pakhomov]

[Text] In May of last year, SOVETSKAYA ROSSIYA inspected stomatological polyclinics in this republic. This was motivated by letters from readers, in which they posed valid questions: Why is it so difficult to get into a dentist's chair, why are there such long lines in these medical institutions? A range of pressing problems was defined: improvement of organizational work at polyclinics, providing them with modern equipment. Almost a year has gone by, which is enough time for changes to have been made. In carrying out the request of the readers, the editorial board decided to take another look at dentists, to see how much the situation has changed in recent times.

There was not a soul at the registry window in the polyclinic of Zheleznodorozhnyy Rayon of Chita. We addressed the registrar.

"You wish to sign up to see the dental prosthodontist?" she asked with surprise and raised eyebrows. "Go on to the office, they give their own appointments for patients."

The next encounter immediately reduced drastically our hopes for an early appointment. It turned out that 32 patients had already been scheduled for the next few days for a first visit to Dr A. Rakshe, 61 were scheduled for V. Mitsenko and 114 for V. Totskiy. And, since the doctors try to distribute their work load evenly, it would have been possible to sit in the chair of a dental prosthodontist no sooner than in 2 months.

"The line could have been considerably longer," stated El'vira Veniaminovna Turulina, chief physician at the polyclinic, without any sign of optimism about the existing situation. "For it is not all people by far who need our help that come to us. Some believe that they can do without prostheses, while others simply do not want to take the trouble of going to a doctor. Still, the work load of doctors and prosthetic technicians is very large."

While the polyclinic in Zheleznodoroznyy Rayon still resembles a medical institution in some way, the same cannot be said about the Oblast Stomatological Polyclinic. It is situated at the very end of the city. It is a small, wood one-story building, which one of the commissions of the Ministry of Health had labeled as "a peasant hut with cold vestibule." As we were told by A. Zolotuyeva, a physician of the polyclinic, about 15 years ago the building was to be torn down....

It would seem that a very definite conclusion could be made: what can be done if necessary conditions are wanting. But let us not be hasty, let us visit yet another place.

At the present time, the municipal stomatological polyclinic is located in the center of Kirov, in a new four-story building. There are only a few people in the spacious vestibule. There is neither a line nor a crowd.

The polyclinic has the most modern domestic and imported equipment, and it has excellent conditions for working and seeing patients.

The polyclinic is designed to receive 1500 patients per day. As a rule, the work is done within the shortest time. At 1200 hours we go to the registrar's office.

[Question] Can we get an appointment late in the day?

[Answer] Of course, come any time....

With the opening of the new polyclinic, the oblast health department added several physicians and technicians to its regular staff. The team at this therapeutic institution works in two shifts, while acute cases are seen around the clock. Experienced stomatologists are also on duty at night. Moreover, a special service was established for treatment, tooth extraction and prosthetic work in the home. This is done for the participants and disabled in the war and labor, individual pensioners or people who are bedridden for a long time.

"We meet the deadlines stipulated by the ministry for furnishing prostheses to all patients," states L. Polonskiy, chief physician. "They do not exceed 3-5 weeks. For a long time we have been applying the principle of maximum volume of work in one patient visit."

All of these steps have reduced appreciably the number of returning patients and raised significantly the percentage of those whose treatment is entirely completed. The figures are 64% for adults and 93% for children.

Yet, all this--both the new building and new equipment--appeared very recently in Kirov, in the second half of last year. But the system of organizing dental care developed (and this should be stressed) much earlier, when stomatologists of Kirov, like those of Chita, worked in old, adapted buildings.

We were told by S. Kulagin, chief of the Main Therapeutic Administration of the RSFSR Ministry of Health: "In recent years, the stomatological service of

Russia has been developing quite rapidly. Five new stomatological faculties were established at VUZ's, and enrollment has increased by 900 people. In 7 years, about 200 polyclinics have been started up, we have overfulfilled the target of expanding the network of stomatological and dental prosthetic departments and offices, primarily in rural areas."

Yes, no doubt changes are taking place, and they are quite noticeable. But nevertheless, as validly written by readers, there are still very many unsolved problems, including organization of the dental service in rural regions. "Our steppe is broad," writes N. Orlova from the Orenburg region. "How many kilometers have to be driven on sideroads, if not by foot, before you reach the rayon hospital to alleviate a toothache. You are busy up to your ears, but sickness does not take this into consideration, and you clock off the kilometers. And, for example, in order to obtain prostheses you have to travel about six times for them to be adjusted."

And this is far from being the only indication. Even in Moscow Oblast, the rural population is experiencing serious difficulties with prosthetic services. The staff of the Department of Hospital Orthopedic Stomatolgy of the Medical Stomatological Institute, who traveled to the Malino Sovkhoz in Stupinskiy Rayon, found that over half the blue and white collar farm workers require dental prostheses. In their patronage capacity, the department's staff decided to provide prostheses on the spot. This is an example worthy of imitating. But what is to be done with other remote kolkhozes and sovkhozes, the number of which cannot be counted in our country?

There are also other instances of the desire of medical personnel to improve care of rural residents. In Rostov Oblast, visiting brigades of stomatologists have been formed and they produce good results. But this method of servicing the rural population, unfortunately, is not widespread, there are not enough special buses with a dental laboratory. This year, the republic will receive only three such vehicles.

Good and accurate performance of orthopedic departments and polyclinics depends primarily on how they are outfitted with modern equipment. High-frequency units are needed to prepare prostheses with use of individual casting. Porcelain and metal-ceramic prostheses cannot be made without vacuum furnaces. Many other items of modern equipment are also needed. New units often are delivered in an incomplete state. Last year, only 17 oblasts and krays in the Federation received small metal-ceramic kits.

One can see quite a few developments of modern stomatological instruments in laboratories and design offices, which are as good as the best models in durability and other indicators. Yet any physician at a rank and file polyclinic will say: "We are working with obsolete instruments, and there is a shortage even of such instruments!"

The validity of the claims of physicians was confirmed to us at the Soyuzmedtekhnika [All-Union Medical Equipment Office]. The needs for stomatological instruments are met in some areas by only 60-80% by the Soyuzmedinstrument [All-Union Medical Instrument] Association of the USSR Ministry of the Medical Industry, and even less for other items. As it

receives requests for stomatological instruments, Soyuzmedinstrument often comments that they will be furnished, provided the enterprises are remodeled or their capacities expanded....

... Thus, almost a year has passed since our last visit to dentists. But, alas, many problems are still there.

### Second Visit to Stomatologist

Moscow SOVETSKAYA ROSSIYA in Russian 3 Jul 84 p 2

[Article by V. Pakhomov]

[Text] In the correspondence pertaining to our article, "Visit to Stomatologist" (18 March 1984), the readers spoke of the long lines to see stomatologists and the difficulties that have to be overcome to receive dentures.

G. Sergeyev, deputy RSFSR minister of health, informed the editorial office that the facts pertaining to unsatisfactory organization of stomatological care of the public were discussed at board meetings of the Chita and Orenburg oblast health departments, Main Public Health Administration of the Moscow oblispolkom. Additional measures have been worked out to improve stomatological care for the public. In Chita, there are plans for construction of two stomatological polyclinics, and 30 stomatological and dental prosthetic departments and offices are to be organized in the oblast. In Orenburg, there has been an increase in number of students in the dental department of the medical secondary school. In Moscow Oblast, it has been decided to adopt the knowhow of Pavlovo-Posadskiy Rayon everywhere with regard to having mobile brigades of stomatologists, including prosthetists, to service the rural population.

Readers responded very actively to the article, "Visit to Stomatologist." In their letters, they mentioned several problems to which, in their opinion, attention should be given by the USSR Ministry of Health. This is why we decided, so to speak, to pay another visit to the stomatologists. And this is what we learned.

In rural areas, for example, there is still a shortage of dentists at uchastok hospitals and walk-in centers, as before. It so happened that more urban young people were admitted to medical secondary schools, and they stayed in the city to work.

The stomatologists have a valid complaint about the fact that industry does not give attention to this important branch of medicine. The Soyuzmedinstrument Association of the USSR Ministry of the Medical Industry meets the needs for some stomatological instruments by only 60-80%.

V. Bazhukhin, chief engineer of Soyuzmedinstrument, reported to our editorial office that the Association has developed and started to produce 130 items referable to the latest stomatological instruments.

Why then is so much obsolete equipment used at polyclinics, if models of newly developed or updated equipment are more durable and a much smaller number is needed? The fact of the matter is that the enterprises that produce these items are, so to speak, at a standstill on their old positions, and they are slow in effecting technical retooling.

We visited the Moscow Stomatological Polyclinic No 17, which is this republic's school of progressive knowhow. At the initiative of the staff headed by Ye. Fel'dman, chief physician, several new presses, apparatus and devices have been updated or developed from scratch. Here, making prosthetics is not separated from treatment. A system of review offices was developed. A many-year experiment was conducted: without increasing the staff, the work load of physicians was reduced somewhat so that they would be able to cure patients in one visit, rather than extent treatment over several days. The result was that treatment quality improved appreciably. While only 49% of the patients were cured previously in the first visit, while the others had to come again, at the present time up to 90% of the patients are cured in the first visit. How much time people are saving!

The model polyclinic is working well in making porcelain and metal-ceramic prostheses, using an imported vacuum furnace and sets of appropriate materials. But how do things stand elsewhere? Unfortunately, innovations are being introduced slowly. Only a few oblasts of the Federation receive small kits of metal-ceramic materials. Vacuum furnaces for firing porcelain are another stumbling block; in 1977, they started to be produced by the Soyuzelektroterm [All-Union Electrothermal] Association of the USSR Ministry of the Electric Industry. Serious flaws were immediately found in the furnace: while it was called vacuum furnace, it did not provide for a vacuum, could not hold to temperature conditions and other standards.

One of these furnaces was delivered to the laboratory of the All-Union Scientific Research Institute of Stomatology. The institute tried to resurrect this unit for 2 years. Finally, in 1980, a statement was prepared concerning its unfitness. The Main Inspectorate for Quality of the USSR Ministry of Health immediately forwarded the appropriate report to the chief of Soyuzelektroterm, V. Kleshchev, and to the Main Inspectorate for Quality of the USSR Ministry of the Electric Industry. This was followed by a temporary ban on production of the ill-fated product. Ultimately, a furnace in good working order was delivered to the institute's laboratory; however, products of poor quality continued, as before, to be delivered to different areas. It is only late last year that the USSR Ministry of Health banned acceptance of the ill-starred item, while Soyuzelektroterm decided only recently to redesign it.

The impression is gained that the USSR Ministry of the Medical Industry underestimates the importance of furnishing the stomatological service with modern equipment, consistent with our times, as well as new materials. Because of this, literally millions of people are suffering. Our readers want to know why this happens, whether the Ministry of the Medical Industry has a clearcut program for future updating of stomatological equipment.

... Let us recall the following figures: up to 80% of the public visit dental offices, while every other person requires prosthetics. This is why we consider the problems mentioned here to be of exceptional importance. Both the public health agencies and industry are called upon to do all they can for this branch of medicine to cope with its tasks. It is time to finally remove toothaches!

10,657  
CSO: 1840/744

UDC 613.98:061.22"1958-1983"

25TH ANNIVERSARY OF INSTITUTE OF GERONTOLOGY, USSR ACADEMY OF MEDICAL SCIENCES, AND ITS ROLE IN DEVELOPMENT OF SCIENCE OF AGING

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK in Russian No 3, Mar 84  
(manuscript received 27 Jul 83) pp 3-9

CHEBOTAREV, D. F., Institute of Gerontology, USSR Academy of Medical Sciences, Kiev

[Abstract] The author, director of the Institute of Gerontology since 1961, outlines its growth and scientific contributions during the 25 years since its founding. The Institute has studied geriatrics, social gerontology and gerohygiene to seek comprehensive solutions to problems in the biology of aging. It has experimental, clinical and hygienic divisions that carry out research and practice at levels all the way from molecular study to comprehensive treatment of individuals. The Institute's collaboration with other Soviet and foreign institutions with related interests and its publication of results of studies that include subjects from middle age to advanced old age are summarized. Nervous system, cardiovascular, respiratory, digestive and motor functions have been investigated and reported on. Another area of interest has been the effects of aging on labor effectiveness. Along with research, practice and hygiene work, the Institute has also sought to provide information to the public and to train classroom teachers for medical educational institutions. International activities include work with the WHO and with medical institutions of the socialist countries, Western Europe and the United States.

[706-12131]

UDC 613.98-07

TYPОLOGY OF INDIVIDUAL LIFE STYLES AND HEALTH OF CITY POPULATION OF RETIREMENT AGE (A SYSTEMIC APPROACH)

Moscow VESTNIK AKADEMII MEDITSINSKИХ NAUK in Russian No 3, Mar 84  
(manuscript received 26 Jul 83) pp 83-89

SACHUK, N. N., Institute of Gerontology, USSR Academy of Medical Sciences, Kiev

[Abstract] Life styles of Soviet citizens, including activities, self-fulfillment entertainment and work, are attracting increasing attention among social scientists. Both natural and social factors affecting life styles were studied for the present report on retirement-age individuals who were no longer engaged in their occupations. Some 2,000 residents of Kiev were studied to determine fulfillment of physical and spiritual needs after retirement. The paucity of similar studies encouraged the author to explain various concepts included in his study. The population studied was then divided into "white" and "blue" collar and male and female sub-groups. In general, results indicated that after retirement, white-collar workers showed better adjustment to their new leisure, spending more time in intellectual diversions and finding a more rational life style with a good mix of physical activity and passive relaxation. White-collar female workers had a less satisfying adjustment; even less were blue-collar men and finally, blue-collar women, whose adjustment was regarded to be the worst. Attendance at cultural events, time spent watching television and goal-orientation are related to health status. Figures 2; references 6:  
3 Russian, 3 Western.

[706-12131]

UDC 312.28;612.67

ANALYSIS OF MORTALITY AS PROBLEM OF BIOLOGY OF AGING

Moscow VESTNIK AKADEMII MEDITSINSKИХ NAUK in Russian No 3, Mar 84  
(manuscript received 26 Jul 84) pp 89-93

VOYTENKO, V. P.

[Abstract] Mortality and longevity have received increasing attention based on general biological conceptions in recent decades as general patterns of aging and individual modifications are sought. Two directions for mathematical modelling have been developed, one calling for the simplest possible model with the least calculations, the other aiming at the greatest completeness and most comprehensive information, regardless of difficulties in computing values. The present article reports on a model that considers

mortality from all causes compared to ischemic heart disease (IHD), using data from the Yearbook of world health statistics covering most European countries. Results indicated that 3 independent factors are responsible for mortality from IHD (with only 8.1% attributed to other causes). Factors affecting the incidence of IHD include those of the external environment, internal disorders affecting homeostasis and disturbances related to both. These results indicate that factors related to industrialization and changes in life style, including sedentary activities, increased body weight hypertension and increased cholesterol, have increased IHD in developed countries. Somewhat lesser but still significant variations were perceived between urban and rural populations. References 14: 6 Russian, 8 Western.  
[706-12131]

#### CORRELATION BETWEEN EDUCATIONAL LEVEL OF WOMEN AND REPRODUCTIVE FACTORS

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian No 4, 1984  
(manuscript received 23 Jun 83) pp 63-74

LAUDAM, L. A., Institute of Economics, Latvian SSR Academy of Sciences, Riga

[Abstract] An analysis was conducted on the number of demographic factors, particularly as they pertain to the Latvian SSR, to uncover those characteristics that may contribute to the low birth rate in Latvia. One of the key factors was identified as the attitude of women with a higher education in combination with socioeconomic realities. Basically, late marriage and less than the "ideal" number of children in that group were of prime importance in defining their reproductive activity and potential. Such factors can be overcome to a significant extent by the creation of social and educational opportunities that would encourage earlier marriages, and employment conditions that would assure adequate salaries for family support and child assistance programs. In addition to creating material conditions that would encourage marriage plans among students, the education programs themselves should be reassessed in terms of time requirements for degrees.  
[723-12172]

RADIATION BIOLOGY

UDC 577.391

EXPERIMENTAL MODEL FOR OBJECTIVE EVALUATION OF LEVEL OF PRIMARY REACTION TO RADIATION IN RABBITS

Moscow IZVESTIYA AKADEMII NAUK SSSR. SERIYA BIOLOGICHESKAYA in Russian  
No 3, May-Jun 84 (manuscript received 17 Feb 83) pp 428-432

ARLASHCHENKO, N. I. and POGOSOV, A. Yu., Institute of Medical-Biological Problems, USSR Ministry of Public Health, Moscow

[Abstract] Monkeys and dogs show similar reactions to radiation as those found in humans, but there are difficulties in using them for experiments. On the other hand, mice and rats differ markedly in their reactions. The present article reports on use of rabbits as relatively similar in reactions to humans, in test of transmission of fluorescein from the blood in eye fluid, as a model for the permeability of vessels of the ciliary tract, and a measure of the hemato-ophthalmic barrier as an obstacle to intravenous fluorescein. The intensity of illumination from the fluorescein through the iris and the ciliary body was measured photographically. Results indicated that a dose of 9 gram-roentgen was needed to produce a pronounced reaction. The role of cell membrane breakdown in this process is discussed. Membrane lipids were destroyed by free-radical oxidation, so that the disturbance of cellular permeability can be regarded as a reaction to the effects of radiation. The direct effects of ionized radiation, however, do not exclude reflector radiation effects. Disturbance of the hemato-ophthalmic barrier signals destruction of hemato-encephalic and hemato-labyrinthic barriers as well. The latter lead to failure of intracranial and intralabyrinthical pressure. The experiments confirmed the usefulness of rabbits for modeling primary radiation effects. Figures 2; references 14 (Russian).

[691-12131]

CONFERENCES

FIRST ALL-UNION CONFERENCE ON SPACE ANTHROPOECOLOGY (NOVOSIBIRSK, DECEMBER 21-24, 1982)

Ashkhabad IZVESTIYA AKADEMII NAUK TURKMENSKOY SSR: SERTYA BIOLOGICHESKIKH NAUK in Russian No 4, 83 pp 78-80

[Article by A. Babayev]

[Text] The area of science that has come to be called human ecology or anthropoecology is concerned with the study of the mutual connection between the environment and human living conditions.

Highly effective and broadly recognized aerospace methods have in recent years begun to be used in human ecology studies. In those studies the aerospace methods are making it possible operatively and regularly to examine the environmental status, detect environmental disturbance types that occur as a result of human economic activity, and determine developmental landscape trends on whose basis the human ecological situation can be predicted. The First All-Union Conference on Space Human Ecology was concerned with the contemporary status and future prospects of such studies.

The conference's opening remarks were made by the chairman of the Scientific-Coordination Council for Aerospace Studies of Natural Resources of the USSR Academy of Sciences Siberian Department Presidium, USSR Academy of Sciences Vice-President A. L. Yanshin, who noted the importance of aerial surveys of the earth for scientific research and the national economy. Aerial survey information is being currently utilized for controlling the environmental status, mineral and raw material resource exploration, in agriculture and forestry, and recently in the study of human ecology as well.

The paper presented by Academician of the USSR Academy of Medical Sciences V. P. Kaznacheyev dealt with problems in the development of space human ecology and its theoretical and methodological aspects. He noted that the interconnection between the biosphere, ionosphere, and space factors is becoming clearer as new data on human ecology are collected. In transforming the biosphere as a whole, humans are turning out to be influenced by space factors whose thorough study constitutes one of the most important tasks of today.

Aerospace methods have enabled us to collect an enormous mass of information which requires thorough processing and analysis. For this purpose it is essential to work out methods of processing the collected information. The classification of the biosphere's structure as applied to human ecology studies has not been well worked out. The geographical concept of the landscape complex is not suited to space human ecology. The author suggested the identification of basin-solar biospheric units (BSU) which are associated with large river activity. It was the author's opinion that those units are well recognized in the aerial surveys and make it possible to study systematically hydrosphere phenomena, based on the premises that hydrosphere dynamics most fully characterize on-going global ecological processes. For example, the BSU's can be used for a complete study of space and anthropogenic impact on hydrosphere mechanism function. Time changes must be analyzed in BSU studies. The author suggested the use of a complete solar cycle (22-23 years) and smaller subunits (11 and 5.5 years) that reflect solar activity changes as time-measuring units.

Academician A. L. Yanshin and L.K. Zyat'kova, in their survey paper "Development of Space Methods for Studies of the Natural Resources of Siberia and the Far East," pointed out three basic directions of space investigations: 1) the study of natural resources; 2) the control of human impact on the environment; 3) the control of public health under various climatic conditions and human health in space.

The creation in 1977 of the Coordination Council for Aerospace Studies of the USSR Academy of Sciences Siberian Department Presidium facilitated the development of aerospace methods in the study of Siberian and Far Eastern natural resources. Investigations that are being conducted with the use of remote control methods are yielding considerable economic benefits. For example, the use of spectrozonal aerial photographic surveys for evaluating the after-effects of forest fires, in comparison to land-based methods, reduces labor expenditures by almost a factor of 20 and cuts operational costs by more than a factor of four.

Considerable attention is being given to the automated processing of aerial survey information. The USSR Academy of Sciences Siberian Department has two operating centers: 1) the Space Information Processing Center, to which excursions were organized for the conference's participants, and 2) the Center for Processing Geologic Information (TsOGI).

The survey paper presented by A. I. Melua, "The Contemporary Status and Prospects for the Development of Space Human Ecology Research Methods," examines research methods that employ space devices. Included among the aerial survey materials used in human ecology studies are television, photographic, radar, and laser-detector devices. The use of aerial survey methods is yielding enormous economic benefits. For example, according to preliminary figures, the use of such devices yields an annual saving for the USA of 300 million dollars in the management of water resources, a saving of 2.0 to 2.5 billion dollars in the improvement of long-term weather forecasting, and a saving of 250 million dollars by increasing agricultural and forestry production.

The director of the State Center "Nature", Yu. P. Kiyenko, spoke about the use of space information to create a comprehensive cartographic cadastre of Siberian natural resources. The goal of the comprehensive cartographic projects is a multi-faceted joint investigation and cartographic inventory of natural resources. Topical maps for separate regions based on aerial information are being compiled, and they are in great demand. Approximately 2,000 production, planning, and scientific-research organizations in our country are interested in obtaining aerial information and topical maps. The State Center "Nature" has compiled topical maps in 30 classifications for one of the southern regions by which more than 100 previously unknown anomalies and 200,000 hectares of eroded pasture were identified. According to preliminary figures, the economic benefits yielded by such operations in the region are near 56 million rubles. Aerial cartography is particularly highly valuable in the exploration for underground fresh water lens in drought-stricken areas. According to preliminary data, the economic savings that resulted from the study of natural resources of this arid region amounted to 5.5 rubles per every ruble of expenditure.

One of the important tasks of aerial surveys of the earth is the composition of experimental programs. A working group composed of representatives from more than 30 organizations of our country was organized to set up such programs. The program contains two sections: 1) survey of the earth's surface from stationary photography systems (KATE-40, MKF-6M); 2) visual-instrumental studies with the use of manual cameras. During the flight of the Salyut space station more than 55 million square kilometers of the earth's surface were photographed by stationary cameras. A complete study of all of the information obtained from this station will take five to ten years. The experience gained in the course of this station's flight in the formulation and execution of experimental programs will be widely used in flights of the remaining stations of this series. Those data are contained in the paper presented by V. V. Arkhipov.

The paper presented by B. B. Prokhorov examined the use of remote control information in the study of human ecology. The work undertaken in this area indicates that remote control methods can be successfully utilized in resolving a series of problems in the environment - population system. Nature zoning for human ecological purposes and the evaluation of individual landscape components are important. It is particularly important to know the extent of environmental pollution in order to study the human ecological situation. Experiments have shown that regions with hazardous sources of pollution are clearly identified on the aerial survey photos. Aerospace information is essential in the study of the contemporary state of the human ecological situation, and particularly in the compilation of forecasting diagrams.

Aerospace surveys are particularly important for the study of the vast and remote forests of Siberia and the Far East. This was the topic of the paper prepared by a group of scientists from the USSR Academy of Sciences Siberian Department Institute for Forestry and Lumber. The scientists suggested that, along with space surveys, selective aerial photography surveys should be

undertaken. The combination of the two types of surveys is particularly effective in studying the post-conflagration dynamics of forest communities and in the study of various kinds of forest damage.

The characteristics of space surveys in the study of natural resources are examined in the paper presented by G. B. Gonin. In his opinion, an investigation of the spectral reflectivity of objects (SRO) currently represents the most promising direction of space survey development. Vegetation biomass, humus content of soil, and contaminated flora sectors can be determined by correlating SRO. A study of the spectral reflectivity of desert objects would make it possible to determine the desolation processes that take place under the influence of various factors.

The development of aerospace methods has opened up broad opportunities in landscape-epidemiological studies and in the evaluation and forecasting of public health. This was discussed in the papers by V. P. Kaznacheyev and A. I. Melua, Yu. V. Mironchuk, V. F. Ovcharov, and in many other reports. Landscape-epidemiological studies provide for medical-geographic mapping, the study of natural breeding grounds of diseases, and an epidemiological analysis of regions that are being successfully accomplished with the use of aerospace information. Thus, for example, whereas an epidemic of any particular disease might be recorded through clinical data, space photos are used to determine the region of the disease's distribution. The role of landscape indicators that are formed under the influence of epidemiological diseases is important in such studies. Environmental pollution is indicative of unfavorable epidemiological circumstances. For example, polluted snow cover around major cities, dust storms, etc., show up well on space photos.

Of all the diversified papers presented at the conference, only the paper by associates at the Turkmen SSR Academy of Sciences N. G. Kharin and A. Babayev, "Investigation and Prediction of Desolation Processes Based on Aerial Survey Data," was concerned with the desert zone. The paper's authors worked out the methodological principles for studying and mapping desolation processes by using aerial survey information. Small-scale maps of contemporary desert formation processes were compiled as were forecasting maps which will be used for compiling a world map of desert formation.

Display reports occupied a significant place at the conference. They were primarily concerned with the study of the human ecological situation and the environment in the Extreme North, Siberia, and the Far East.

Following a discussion of the numerous papers, the conference adopted a detailed resolution calling for the broader use of aerial photography survey data in the study of human ecology, natural conditions and resources.

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ALL-UNION CONFERENCE ON MOLDS: PHYSIOLOGY, BIOCHEMISTRY AND BIOTECHNOLOGY  
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BELOVA, N. V., Botanical Institute imeni V. L. Komarov, USSR Academy of Sciences, Leningrad

[Abstract] The All-Union Conference on "Molds: Physiology, Biochemistry and Biotechnology" was held in Pushchino on October 10-12, 1983, and fell within the plans of the Decisions of the CC CPSU regarding "Further Development of Physicochemical Biology and Biotechnology and Application to Medicine, Agriculture and Industry". The Conference consisted of 18 plenary sessions, and included 67 section reports and over 110 displays in the poster session. Prior to the Conference, the proceedings were published in the form of short abstracts. The themes covered at this Conference included the composition and biochemical organization of the molds, metabolism and metabolite biosynthesis, fungal genetics and molecular biology, enzyme production, and protein synthesis by the mycelial fungi. This Conference underscored the importance of this branch of biology in current industrial development.  
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